AVIATION WEEK

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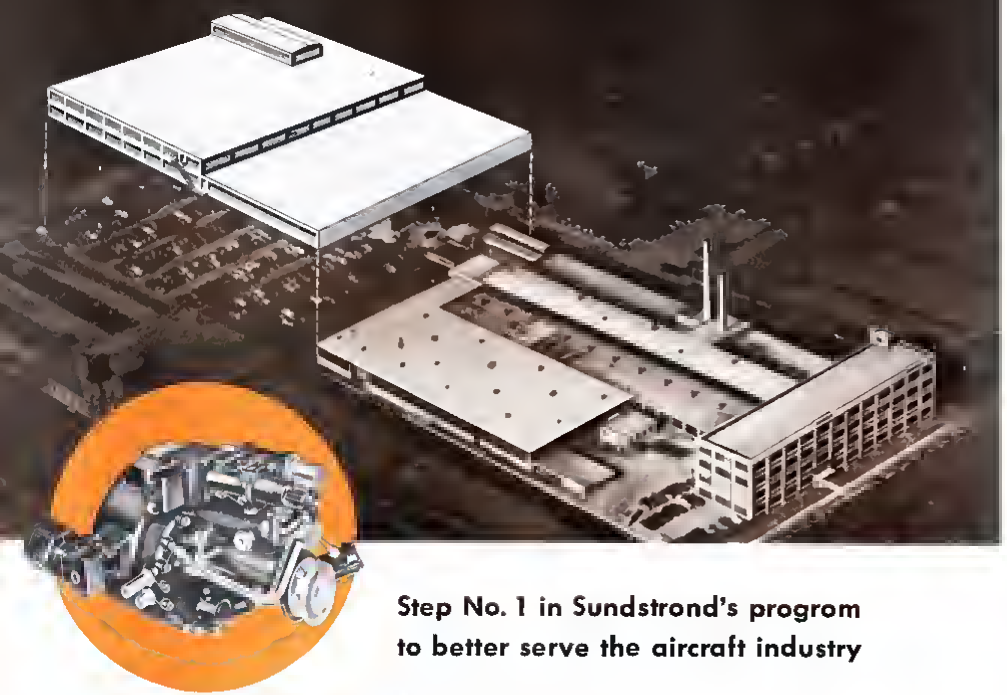
JAN. 28, 1952

50 CENTS

New plant addition at SUNDSTRAND to increase output of constant speed drives



Sundstrand Constant Speed Drives are driven from the engine pad at speeds of approximately 3000 to 9000 rpm, delivering full power and constant speed over this range of input speeds. Less than 2 cycle frequency variation is permitted on 400 cycle output. Made in three types—"Package," "Integral," and "Split" drives.

Step No. 1 in Sundstrand's program to better serve the aircraft industry

Since Sundstrand's Constant Speed Drive first proved itself on the B-36, demand has mounted for more and more of these units to supply AC power on other types of aircraft. As orders were confirmed for the Martin P5M-1, the Westinghouse J-40 jet engine and other applications, steps were taken to augment manufacturing facilities. First step is this modern plant addition at the Rockford plant, which will triple production of the drives. Equipped with the finest of precision machinery, and staffed with highly skilled workmen, it will be in full production by mid-1952. Other developments being taken to increase output will be announced shortly to make Sundstrand's *reliable* research, *expert* engineering, and *precision* production available to more aircraft manufacturers.

SUNDSTRAND

SUNDSTRAND AIRCRAFT HYDRAULICS

SUNDSTRAND MACHINE TOOL CO.
HYDRAULIC DIVISION, ROCKFORD, ILL.

AIRCRAFT AND INDUSTRIAL HYDRAULIC TRANSMISSIONS, PUMPS, MOTORS AND VALVES • OIL BURNER PUMPS • AIR SANDERS
LATHES, MILLING, BROACHING AND SPECIAL MACHINES • BROACHING TOOLS • MAGNETIC CHUCKS

B.F.Goodrich

9 airlines report lower landing costs with B. F. Goodrich brakes

HERE'S WHAT maintenance superintendents and engineers of nine airlines have to say about the B. F. Goodrich Expander Tube brakes they are using on DC-3's:

"Far superior ... both operational and maintenance wise."

"... Have trouble-free operation and low parts replacement costs."

"... by far best DC-3 brake available."

"Figures compiled to 1947 when operating other brakes and testing the B. F. Goodrich Brake A—44¢ per landing, Brake B—17¢ per landing, B. F. Goodrich—7¢ per landing."

"Brakes give trouble-free service, not encountered any particular maintenance problem."

"Records indicate B. F. Goodrich substantially cheaper to operate than ordinary brakes. B. F. Goodrich is trouble-free brake."

"Service life of tires and brake drums increased when using B. F. Goodrich. B. F. Goodrich far superior."

"Operated 2 years with ordinary brake and maintenance very costly. Switched to B. F. Goodrich and costs have been very little."

"Cost of B. F. Goodrich has been determined to be 4¢ per landing" (parts replacement).

These comments all add up to "lower landing costs." BFG Expander Tube brakes cut cost per landing several ways. Full circle braking action spreads wear more evenly, lengthens brake life. Parts last longer because brake design dissipates heat quicker. Retractor spring action eliminates wear due to drag. Simple design of the brake reduces in-shop time. Extra parts and linkages are eliminated. Only tools needed to relline brake are screwdriver and pliers.

Product of BFG research and engineering, Expander Tube brakes can be designed into any plane. Write the B. F. Goodrich Company, Aeronautical Division, Akron, Ohio.

B.F.Goodrich
FIRST IN RUBBER

Aviation Week

ABP Member ABC

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NEWS DIGEST

DOMESTIC

Robert P. Patterson, former Secretary of War, was among the 23 passengers and crew killed when American Airlines Convair crashed into Elizabeth, N. J., apartment house, while making approach to Newark Airport during dense fog and rainstorm Jan. 22. Eight others died in homes which were set afire.

Maj. Gen. **Donald Putt** has been assigned as Commanding General of Wright Air Development Center, succeeding Maj. Gen. Frederick L. Dent. New Deputy Commander is Brig. Gen. Al Boyd.

Korean airlift DC-4, en route to McChord AFB, Washington, crashed into the water while attempting an emergency landing at Sandspit Airport, British Columbia, Jan. 19. Of the 40 military passengers and crew of three, seven survived.

Civil aircraft shipments during October, 1951, came to 227,300 lb. airframe weight, numbering 124 planes valued at $3.8 million. In the same month, 343 engines totaling 77,300 hp were shipped, valued at $670,000. Aircraft plant employment was 331,102 and engine plant employment had reached 63,430.

Martin 4-0-4 was put into scheduled passenger service Jan. 15 by Eastern Air Lines and Trans World Airlines, operating from LaGuardia Field, N. Y.

Leon Beaty Judd, comptroller of Delta Air Lines and one of its earliest employes, died Dec. 26 at Centre, Ala., at the age of 50.

Strike at Fairchild Engine's Guided Missiles and Stratos divisions, Farmingdale, L. I., N. Y., began Jan. 18 and ended Jan. 21, when IAM Locals 893 and 900 returned to work at request of U. S. Mediation and Conciliation Service. Contract negotiations have been underway since early December. Union has reduced earlier demands for 30-cent-per-hour increase to 15 cents and asks a modified union shop.

Jefferson Crane, vice president of National Airlines, died in Miami on Jan. 20. He was 43 years old. He had been with National since 1936.

Lawrence A. Razete, electronics company official, was found guilty in federal court, Dayton, Ohio, of giving gifts to an Air Materiel Command buyer and of conspiring to defraud the government. Defense attorneys announced they will appeal following sentencing of Razete on Jan. 29.

Independent Military Air Transport Assn. was spanked by two of its largest members for calling for a congressional investigation of the scheduled airlines and the Civil Aeronautics Board. Seaboard & Western Airlines resigned. Transocean Air Lines disavowed IMATA's statement and policy. Both carriers said the organization was formed solely for the purpose of coordinating traffic for the military services and that political activity should be considered outside its sphere.

Defense Department changes last week. Gen. Joseph T. McNarney, chairman of the department's management committee and USAF officer with longest service, announced retirement Jan. 31. Eugene Zuckert, Assistant Air Force Secretary, was nominated to the Atomic Energy Commission.

FINANCIAL

Solar Aircraft Co., San Diego, Calif., has voted a regular quarterly dividend of 22.5 cents per share of preferred stock, payable Feb. 15 to holders of record on Jan. 31.

Delta Air Lines declared a 25-cents per share dividend, payable Mar. 1 to holders of record Feb. 15.

American Airlines has declared a regular quarterly dividend of $.875 per share on the carrier's $3.50 cumulative convertible preferred stock, payable Mar. 1 to holders of record on Feb. 15.

Aeroquip Corp., Jackson, Mich., has declared a regular five-cents quarterly dividend payable Feb. 15 to holders of record on Feb. 1.

INTERNATIONAL

SIPA 200 jet-powered lightplane has made its first flight from Villacoublay Airfield, near Paris. Powerplant is a Turbomeca Palas unit. SIPA 200's gross weight is given as approximately 1,600 lb.

Dr. Albert Roper, Secretary General of the International Civil Aviation Organization, retired Dec. 31, after more than 30 years service in international aviation. He was ICAO Secretary General since 1945.

AVIATION CALENDAR

Jan. 28-31—114th National Meeting of the American Meteorological Society, Roosevelt Hotel, New York

Jan. 28-Feb. 1—20th Annual Meeting the Institute of the Aeronautical Sciences, Astor Hotel, New York

Feb. 7—Meeting of Society of Automotive Engineers, Igor I. Sikorsky will speak on helicopter programs, Brass Rail Restaurant, 5 Ave near 43 St., New York

Feb. 7-8—Regional meeting of Instrument Society of America, Power Plant Symposium, Hotel Statler, New York

Feb. 13-15—Area Agricultural Aviation Conference, with unveiling of Ohio Project agricultural plane Feb. 15, headquarters at Seneca Hotel, Columbus, Ohio

Feb. 14-15—AIA National Aircraft Standards national meeting, Hollywood-Roosevelt Hotel Los Angeles

Feb. 19-20—Piper distributors meeting, Lock Haven, Pa.

Mar. 3-6—Institute of Radio Engineers, Waldorf-Astoria Hotel & Grand Central Palace, New York

Mar. 3-7—Spring meeting of American Society for Testing Materials symposium on testing metal powders and metal powder products, Hotel Statler, Cleveland

Mar. 14—National Flight Propulsion Meeting, Institute of the Aeronautical Sciences Cleveland

Mar. 17-19—Second Midwestern Conference on Fluid Mechanics to be held at Ohio State University

Mar. 17-21—American Society of Tool Engineers industrial exposition and annual meeting. Theme: "Tooling for Security," Chicago. (For information write Denham & Co., 812 Book Building, Detroit.)

Mar. 30-Apr. 3—Convention of American Association of Airport Executives Ft. Worth

April 21-24—National Aeronautic Meeting and Aircraft Engineering Display, Society of Automotive Engineers, Hotel Statler, New York

May 6—International Air Transport Assn., fifth annual technical conference, Copenhagen

May 8-9—Fifth annual Wisconsin Aeronautics Conference, Green Bay

May 14-16—Society for Experimental Stress Analysis spring meeting, Hotel Lincoln, Indianapolis

June 9-21—Triennial meeting of International Organization for Standardization, host American Standards Assn., Columbia University, New York

PICTURE CREDITS

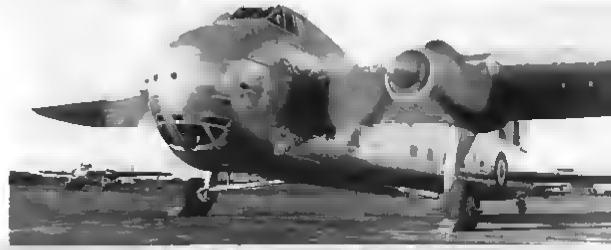
9—(top) British Information Service, (middle, left) Acme Aircraft Co. (middle, right) McGraw-Hill World News (bottom) William Green. 23—United Aircraft Corp., 41—Northrop Aircraft Inc. 46—Consolidated Vultee Aircraft Corp. 60—CAA, 69—Wide World

DELTA FIGHTER TESTED—New Gloster GA5 (above). All-weather interceptor for RAF has two powerful Armstrong Siddeley Sapphire jets of at least 7,200 lb. thrust each, carries considerable interception radar.

Plane News In Pictures

TWIN NAVION HYBRID—Artist's view (left) of modified Navion having two 125-hp. O-290-D Lycomings, which, complete with cowlings, came from Piper lightplane. Acme Aircraft Co., Lomita, Calif., is completing craft for use as test bed by an aircraft equipment firm.

MULTI PURPOSE FREIGHTER—Warming up (right) is first of a number of non-standard type Bristol Freighters ordered by Royal New Zealand Air Force for casualty evacuation, supply dropping, cargo, air-sea rescue, troop transport, and aerial top dressing of substandard soils. Windows under nose seem to be a new modification.



FOKKER PROFILE—S-14 (below) side-by-side jet trainer shows neat lines. Powered by a 3,600-lb.-thrust Rolls-Royce Derwent, the S-14 does 440 mph., cruises at 400 mph., has a gross weight of 11,250 lb.

INDUSTRY OBSERVER

► Contract for two prototype automatic piloted interceptors is at Wright Patterson AFB awaiting to get signature of Convair officials, according to military sources. The interceptors, designated XF-102 by USAF, are each to be powered by one Pratt & Whitney J-57 turbojet engine. Automatic electronic controls for the planes which will require a human pilot only for monitoring are now in manufacture by Hughes Aircraft Co. The plane which will greatly resemble Convair's XF-92A delta-wing research fighter, is expected to be flying early in 1954, or within 20 months after Convair and USAF can iron out certain patent right differences in connection with the XF-92, carried over to the XF-102 production prototype.

► **Shortage of Wright R-3350 engines, due to go into Fairchild C-119 Packets both at Hagerstown and at Kaiser-Frazer's Willow Run plant, is being felt. Fairchild managed to get some Pratt & Whitney R-4360 engines because the Douglas-Long Beach strike diverted them from Douglas C-124s and made it possible to continue the Packet line at Hagerstown, with hastily reworked assembly fixtures. But Kaiser-Frazer has just received its first Wright engines, Detroit sources say, and part of the delay in flying the first Willow Run-assembled C-119 is blamed on this.**

► If the Cessna Aircraft Co. plan to purchase control of Seibel Helicopter Co. stock goes through as expected, Cessna will be a powerful new competitor in the rotary wing field. Seibel directors have recommended acceptance of the proposal which involves exchange of Cessna stock. Seibel is the fifth U. S. manufacturer to get CAA certification on its helicopter, and is now getting evaluation tests for military use on the machine from USAF and Army Field Forces. Since Cessna already is the leading manufacturer of current liaison-type fixed-wing planes for USAF and Army, the Seibel purchase will give it a rotary wing entry into the liaison field too, as well as a design for projection into larger sizes whenever Cessna wants to undertake such a move.

► **Interesting angle in the forge press-extrusion press program, which the Air Force is finally getting under way, is that a new technique has been developed for producing forging stock for the forge presses by extruding billets of required sizes from the extrusion presses. It is expected to be a considerable manhour saver. If it works out as expected, it will mean high utilization for the extrusion presses, which can be busy squirting out billets when not on other extrusion assignments.**

► In the last year in the course of getting its production lines set up for Navy and Air Force fighters and attack bombers, North American Aviation's Columbus, Ohio, plant has produced airframe equivalent of 325 airplanes in spare parts for T-6 and T-28 trainers, B-25 and B-45 bombers, F-51 and other fighters not named, and in remanufacture of T-6G trainers. The plant is making two new versions of the Navy Savage attack bomber, the AJ-2P photographic plane and the AJ-2. The division also will produce the F-86F and F-86H, two new versions of the Sabre for the Air Force and the FJ-2 Fury, Navy sweptwing fighter.

► **The Convair T-29B, which is the latest military navigation trainer version in production of the Convair Liner airliners, is being eyed as a potential medium-range military transport by MATS. Tentative plans call for MATS to get one of the T-29Bs, minus the special navigation fittings and rigged up as a hospital ship. If it works out as anticipated, Convair probably will get an additional order for the twin-engine transports with a cargo designation of C-131.**

► Convair's sweptwing eight-jet YB-60 bomber is getting pre-flight vibration tests at Ft. Worth. The around-the-clock tests are to determine whether there are objectionable flutter characteristics in the plane structure at any one of 43 locations. Electric vibrators are being used at the selected stations on wings, tail surfaces, fuselages, pods, etc., with various frequencies of vibration and combinations of frequencies. The full-scale plane tests will be compared with windtunnel tests of a scale model under extreme vibration.

WHO'S WHERE

In the Front Office

Edward G. Bern has been elected a vice president of Panagra. will continue as sales manager. Bern, who has been a pilot since 1917, joined the carrier in 1949.

Changes

James Standfield has been named assistant to the president of Flexible Tubing Corp., Guilford, Conn., and will handle all advertising, sales promotion, publicity and coordination of government contracts.

Thomas Purcell has been made chief design engineer for Prewitt Aircraft Co., Clifton Heights, Pa.

Joseph G. Van Nest has been named to the new position of director of purchases for Purolator Products, Inc., Rahway, N. J.

Joseph J. O'Connell, Jr., former CAB chairman, has become Pioneer Air Lines Washington attorney.

A. Howard Hasbrook has been designated administrator of field research for crash injury research at Cornell University Medical College. He was formerly in charge of CAA's flight and accident evaluation section.

William D. Kennedy, formerly vice president and general manager of Wright Aeronautical Corp. (now division), has joined Bristol Aeroplane Co. of Canada Ltd., Vancouver, B. C., as general manager.

Homer R. Oldfield, Jr., has been appointed resident manager of the new General Electric advanced electronics center at Cornell University, Ithaca.

J. L. Raesler has been appointed chief of engineering administration for Kaman Aircraft Corp., Windsor Locks, Conn. **D. W. Robinson** was made chief of test and development. **S. R. Thompson** was promoted to assistant chief of research. **R. H. Daniels** has been named assistant chief of test and development and **G. F. Quigley** has been upped to assistant project engineer.

Olen V. Andrew has been promoted to operations manager of TPA Aloha Airline, succeeding former vice president of operations **William Randall**, resigned.

William Davey has been named assistant manufacturing manager for Piasecki Helicopter Corp., Morton, Pa.

C. F. Lehman has been appointed plant superintendent of metalcraft manufacturing operations for Goodyear Aircraft Corp., Akron, Ohio. **Albert Goulding** has been named plant superintendent of the newly created fighter division.

Honors and Elections

Juan T. Trippe, president of Pan American World Airways, has been made a Knight of the Order of Boyaca by the Colombian government in recognition of his aviation achievements.

Melvin E. Fisher and **Robert J. Cramer**, CAA aircraft communicators at Columbus, Ohio, have received Awards of Merit from the Flight Safety Foundation for their success in talking down a lost airman, who had no instrument experience, during bad weather.

Washington Roundup

Race for Atomic Weapons

A race among the three services for atomic weapons is on. The outcome will be the major determinant of their future roles.

Development of small A-bombs has brought carrier aviation, the medium range bombing force and tactical air into the picture to deliver atomic attack. And emphasis which has been placed on intercontinental bombing is dwindling.

As yet, aircraft still are the only means for delivering atomic attack. This fact is behind the Administration's decision to expand USAF and Naval aviation and divert over half of defense procurement money to aircraft. But the day is passing, too, when aircraft are the sole media to deliver atomic attack.

Last November, Joint Congressional Atomic Energy Committee miscalculated. Members anticipated the services would cling to their conventional weapons, resist acceptance of A-weapons upsetting old strategic concepts.

So the Committee prodded: It adopted a resolution requiring Department of Defense to report on plans to "maximize" utilization of atomic weapons.

The services didn't need the prod. They're eagerly staking claims to A-weapons.

Prospect now is that the committee's task will be to restrain, not spur, the services in atomic utilization.

And this promises to set off sharp inter-service—and intra-service—rivalry, already brewing.

• This is the situation now: With the end of Air Force's atomic bomb monopoly, Naval air is making a comeback. Navy Secretary Dan Kimball is publicizing Navy's aim for a new 60,000-ton carrier each year for the next decade.

• But Ground Forces and the surface Navy see atomic developments opening the way to overcoming air power's vast predominance in today's defense.

Army's A-Plans

Army wants atomic guns, radioactive dust and guided missiles for short-range atomic attack that would supplant tactical air. With these, Army men say, a comparatively small force could win over a massive arms on the battlefields. The advantage: Valuable industrial capacity wouldn't be wiped out for later reconstruction, non-combatants wouldn't be injured and killed.

These developments aren't far off either, according to indications:

• K. T. Keller, who is director of the Office of Guided Missiles at Defense Department, has reported to the Joint Congressional Atomic Energy Committee that the three missiles he designated for production—two Navy and one Army—will be ready for use in 16 to 20 months.

• Army has shown the committee its model gun 'designed to handle atomic shells."

Navy's New Plans

Navy surface fleets are eager and optimistic on guided missiles. Two heavy 13,000-ton cruisers, the Canberra and the Boston, are soon to be converted by Navy into the world's first known guided missile-carrying ships.

Many Navy airmen play down the guided missile as a development "on the other side of the rainbow." But Chief of Naval Operations, Adm. William Fechteler, a former "battleship" admiral, sees it as an improvement over aircraft, wants to go all out in pushing its development and utilization.

Fechteler's comment: "Weaponeering has been greatly improved by the airplane but it is still necessary for men and expensive machines to make delivery, and the closer those men and machines approach the target, the more accurate is their delivery. At best they are within range of enemy counteraction. The next and the logical step following the piloted plane is the externally guided missile."

Bomber Proponents

Intercontinental bombing proponents see the atomic-powered airplane giving them ultimate victory in the race for dominance. A faction of Naval airmen is critical of the "carrier" admirals who didn't put up a fight for development of the atomic-powered plane as a Naval seaplane, instead of a land-based USAF plane. They claim that takeoffs from land will require fantastically long runways.

Defense Department's blueprint of how atomic energy is going to be used in the military program is due for submission to the Congressional Atomic Committee in a few weeks.

Rail Mail Rates

Even with the 95% boost in mail pay rates recently granted the railroads, air carriers can't meet the price competition.

Rail will now receive:

• An average 26 cents a ton mile for first class mail. The Big Four airlines receive 45 cents a ton mile.

• An average two cents a ton mile for second, third and fourth class mail—the bulk of Post Office's $400-million a year mail business that nonskeds and air freight carriers would like a slice of. Best price the air carriers could offer for bulk shipments, under contract, though, is about 15 cents a ton mile.

Ninety nine percent of Post Office's mail business now goes to surface carriers. Department officials estimate this will continue for a long while.

Construction Differential

Sen. Pat McCarran's proposal for a "construction differential" subsidy to assure that U. S. international carriers can purchase planes as cheaply from U. S. manufacturers as their competitors can buy abroad hasn't a chance of getting through Congress.

• Administration, including Civil Aeronautics Board, will oppose it.

• Manufacturers and airlines are split among themselves on the issue.

• And Congress is allergic at this time to any variety of subsidy.

Coming hearings before Senate Interstate and Foreign Commerce Committee, though, will likely serve a purpose. They'll focus attention on subsidization of foreign airlines at the time mail support for U. S. lines comes up for test on the House side of the Capitol.

—Katherine Johnsen

AVIATION WEEK VOL 56, NO 4 JANUARY 28, 1952

Budget Asks $14 Billion for Air Contracts

- **Aviation procurement is $1 billion under last year.**
- **But money left from '52 will push spending higher.**

By Katherine Johnsen

U S aircraft industry can expect a downward trend in new military contracts, but a sharply increased influx of government money.

This is what the President's $50 billion defense budget for the 1953 fiscal year, starting July 1, spells out for the industry.

►**Less New Money**—The services will have $1 billion less to obligate on aircraft, engines, parts, and equipment procurement than they have this year—$14 billion, as compared with this year's $15 billion. Here is how the money is sliced:

	'52 Fiscal	'53 Fiscal
	(In Billions)	
Air Force	$11.2	$10.7
Naval Air	3.8	3.3
Army Aviation	.036	.060

►**Rise in Spending**—But expenditures will mount sharply, as output, contracted for after the outbreak in Korea in mid-1950 spurred military mobilization, rolls off production lines. The estimate: Payments by the services to aircraft, engine, parts, and equipment producers will approximate $9 billion in the 1953 fiscal year, compared with an approximate $4.5 billion this year and $2 billion during the 1951 fiscal year.

►**More Air Power**—The budget supports a build up of air power:

- An increase in USAF strength from 95 wings, previously authorized, to 143 wings—126 combat and 17 transport. USAF now stands at 90 wings.
- An increase in Navy's present strength of 14 air carrier groups to 16 air carrier groups.

Navy will achieve its modest build-up by mid 1953—with money in the 1953 budget.

But the USAF build up is a long haul project and for the most part still a "paper" project. The present target for achievement of 143 wings in being mid 1955 or the end of that year. With funds in the 1953 budget, it is anticipated USAF will attain a maximum of 120 wings by mid-1953. The Administration's plans for the future contemplate a 130 wing USAF by mid 1954 and the full 143 wing force by mid-1955. But this hinges on future appropriations—and the outlook as it is affected by a new Congress and possibly a new President.

The budget reflects these axioms of the Administration on the defense program:

- **Stretch out production** to lessen the hardship of civilian industries from materials shortages. This accounts for the President's request for less money for plane buying in the coming year.

Altered by the military for an all-out war in December, 1950, the Administration originally set a mid 1952 date for achievement of military goals. Now the tension has lessened. Administration concern has shifted from defense to preservation of a vigorous civilian economy from an immediate military build-up to long-haul mobilization measures.

- **Emphasize "quality"** instead of "quantity" production. Administration apprehension at the prospect of huge stocks of obsolete military hardware has channeled emphasis in the defense build-up to new advanced weapons and research and development. In line with this, the guided missile and aviation research and development programs also are being sharply stepped up.

The budget earmarks $452.8 million for USAF and Naval air guided missile procurement, compared with $164 million this year. In addition, it allots Navy $32.5 million "to equip a number of air squadrons and supporting service units with special missile-test and missile-handling equipment to make possible the employment of guided missiles as service weapons."

Army's guided missile program is being stepped up sharply, also. Indicating this, the budget earmarks $2.5 billion for "ammunition and guided missiles" compared with $2.1 billion which had been allotted for this category this year.

Funds for USAF and Naval Air research and development are up from this year's $647 million to $710 million in the 1953 budget. Money for USAF is boosted from $485 million to $525 million, for Naval Air, from $162 million to $185 million.

Army wanted to double its aircraft procurement program, but Administration cleared only $36 million for aircraft procurement for '53 compared with the $60.7 million Army has this year.

- **Mobilization.** From $98.5 million in 1951 fiscal year, funds for USAF and Naval air industrial mobilization programs nosedive to $10.9 million for the '53 fiscal year. USAF's industrial mobilization program will retrench. The $3.7 million earmarked for it in the

Funds for Air Power

Money to Obligate—

	1951 FISCAL (ENACTED)	1952 FISCAL (ENACTED)	1953 FISCAL (RECOMMENDED BY THE PRESIDENT)
Air Force	$16,699,571,200	$22,725,877,820	$22,456,140,770
Naval Air	4,386,758,181	5,257,893,000	4,998,042,000
Army Aviation	153,408,247 [1]	134,705,575 [1]	102,913,622 [2]
TOTAL FOR AIR POWER	$21,239,737,628	$28,118,476,395	$27,537,096,392

Expenditures—

	1951 FISCAL (ACTUAL)	1952 FISCAL (ESTIMATED)	1953 FISCAL (ESTIMATED)
Air Force	$6,381,126,329	$12,386,276,190	$18,980,700,000
Naval Air	1,031,459,709	1,980,000,000	3,410,000,000
TOTAL FOR AIR POWER [2]	$7,412,591,038	$14,366,276,190	$22,390,700,000

[1] Exclusive of funds for electronics for air operations and guided missiles which are not available.
[2] Expenditures figures for Army aviation not available.

NOTE: Funds for air power include money for all military aviation purposes.

Aircraft and Related Procurement

Money to Obligate—

	1951 FISCAL (ENACTED)	1952 FISCAL (ENACTED)	1953 FISCAL (RECOMMENDED BY THE PRESIDENT)
Air Force	$ 8,114,775,472 ($1,525,000,000) [1]	$11,882,396,000 ($625,000,000) [2]	$12,685,044,000 ($1,685,044,000) [1]
Naval Air	3,452,092,181 ($330,000,000) [1]	4,333,000,000 ($450,000,000) [2]	3,960,042,000 ($460,042,000) [1]
Army Aircraft	118,120,364 [3]	60,786,073 [3]	56,107,000 [3]
TOTAL for aircraft and related procurement	$11,684,988,017	$16,276,182,073	$16,681,193,000

Expenditures—

	1951 FISCAL (ACTUAL)	1952 FISCAL (ESTIMATED)	1953 FISCAL (ESTIMATED)
Air Force	$1,939,537,349	$4,000,000,000	$9,000,000,000
Naval Air	588,545,401	1,200,000,000	2,500,000,000
TOTAL for aircraft and related procurement [2]	$2,528,082,750	$5,200,000,000	$11,500,000,000

[1] Amount to liquidate prior contracts is included in figure above it.
[2] Exclusive of funds for electronics and guided missiles.
[3] Army aircraft expenditure figures not available.

What Truman Wants for Air Power

The President's budget for the 1953 fiscal year, starting July 1, 1952, earmarks new funds for air power—exclusive of money to liquidate prior contract obligations—as follows, with comparisons with previous years:

Air Force

	1951 Fiscal (Actual)	1952 Fiscal (Estimated)	1953 Fiscal (Recommended by the President)
Aircraft, parts, equipment procurement	$6,601,080,633	$11,203,295,623	$10,696,234,000
Guided missile procurement	149,262,739	130,887,287	300,000,000
Industrial mobilization	69,126,336	13,429,274	3,766,000
Electronics and communications equipment procurement	435,686,673	422,901,799	400,000,000
Training equipment procurement	164,366,861	139,361,139	60,000,000
Construction, U S	570,567,220	870,692,330	700,000,000
Construction, overseas	353,613,124	683,958,670	500,000,000
Research and development:			
(a) Aircraft	$52,335,143	$74,227,000	$74,071,000
(b) Guided missiles	51,687,024	116,052,000	110,381,000
(c) Propulsion	48,497,827	69,503,000	96,677,000
(d) Electronics	48,155,737	54,624,792	68,697,000
(e) Armament	30,293,522	35,536,000	45,507,000
(f) Equipment	36,615,943	41,149,000	42,017,000
(g) Sciences	36,577,047	63,884,000	64,411,000
(h) Special projects	15,695,809	24,477,470	16,545,000
(i) Laboratory operations	4,731,486	5,864,000	6,694,000

Naval Air

Aircraft, spares, parts, equipment	$2,860,809,199	$3,812,081,507	$3,284,880,000
Aircraft ordnance procurement	57,741,000	51,079,000	37,497,000
Guided missile and target drone procurement	101,261,000	33,852,000	152,800,000
Guided missile outfitting			32,595,000
Training equipment	4,735,000	10,938,000	6,455,000
Aircraft modernization	107,751,000	29,203,000	18,368,000
Research and development	334,148,657	161,519,000	185,000,000
Industrial mobilization	29,375,191	6,221,000	7,206,000
Aircraft overhaul USN	220,058,532	245,483,000	141,078,000
Aircraft overhaul, USNR	50,190,668	34,185,000	52,860,000

Army Aviation

Aircraft procurement	$118,120,364	$60,786,073	$56,107,000
Ammunition and guided missiles	1,841,170,694	2,121,340,420	2,558,561,000
Electronics and communication equipment	725,633,976	549,894,223	225,909,000
Research and development (air defense materiel and techniques)	35,287,883	73,919,502	66,806,622

1953 fiscal year compared with $13.4 million this year. Naval air s program will continue at about the same level. It's earmarked $7.2 million for '53 compared with $6.2 million for this year.

This is how the President's $50 billion 1953 defense budget is sheed (exclusive of about half a billion for the Office of Secretary of Defense):

Army, $13.8 billion
Navy, $13.8 billion
USAF, $22.4 billion

This marks the second year that USAF's budget surpasses that of either of the other two services and the first year in recent history that Navy's budget is larger (by $16.3 million) than the Army's, relegating the Army, which up to two years ago received the biggest cut of defense money to third position among the services.

The Navy is budgeted for a slight $16.3 million more than Army for the 1953 fiscal year.

Reason for the shift in service emphasis air power—which now accounts for over half of defense procurement.

Two years ago in the 1951 fiscal year, this is how the $49 billion defense budget was sheed:

Army, $19.4 billion
Navy, $13.0 billion
USAF, $16.7 billion

The current 1952 fiscal year marks USAF's rise to dominant service. This year's $60 billion defense budget is sheed:

Army, $20.9 billion
Navy, $16.2 billion
USAF, $22.7 billion

Navy to Use Teak On Carrier Decks

Navy has gone back to teakwood for its smaller carrier flight decks. The original material used in earlier carriers, because of the material's durability and strength. Douglas fir decking had been installed on all Navy carriers except the Midway 45,000-ton class which has steel flight decks.

Carrier Oriskany (commissioned in 1946) was modified in 1950 with teakwood laminations on its Douglas fir flight deck in the areas of greatest wear. This has resulted in recommendation that other wooden-deck carriers be modified similarly. Navy Bureau of Ships' recommendation followed inspection after more than 10,200 landings, with both jet and propeller planes being considered.

Get in the Scrap—Turn Yours in for Defense

Funds Asked for Jet Liner Tests

CAA Prototype Committee wants to study Avro, F3D and B-45 for possible carrier development.

A new plan for commercial airways and operations testing of three jet aircraft types—Canadian Avro Jetliner, Navy F3D night fighter and Air Force B-45 bomber—was under Budget Bureau scrutiny last week.

The CAA Prototype Committee, sponsor of the plan, hopes Congress will support such a program with $1.2 million in supplemental appropriations for fiscal 1953.

The military now approves this prototype program so do the pilots, airlines, manufacturers and civil aeronautics authorities. Air Force and Navy representatives on the Prototype Committee have said they favor the program because it will help airways programming and techniques.

▶**Realistic Program**—Congress last year turned down an earlier CAA budget request for prototype money to test a B-45 bomber in "simulated" commercial transport operation. But the new program has military support and also includes a commercial jet transport, plus tactical military planes. Observers consider this a more realistic program for testing requirements for airways and jet transport operations in the coming jet era.

Also, it is presumed that the Canadian built Avro Jetliner will afford valuable design data. The committee believes the use of this jet transport will help U. S. airlines and manufacturers write specifications for newer jet transports. As to the possibility of using a de Havilland Comet jet transport, CAA Administrator Charles F. Horne told the Prototype Committee that he doubts any Comets are available.

▶**The New Program**—The proposed program would cost about $1.2 million over a 15-month period, the committee believes. Here is the program:

• **One Avro Jetliner.** This is a four jet transport. The committee would install special equipment for testing airways and obtaining aircraft design information. Tests would include 45 hr. airworthiness tests at cost of $750 per hour during the two months between May 1 and June 30. Then there would be 365 hours of operational tests at $500 per hour during the fiscal year from July 1, 1952 to June 30, 1953.

• **Two Douglas F3Ds.** These are two-jet Navy night fighters equipped with dive brakes. Plan is to instrument one of them for airworthiness tests and the other for airways electronics. Both would be equipped for obtaining design information. Tests would include 80 hr. of airworthiness tests at $600 per hour from May 15 to Oct. 15 this year, and 325 hr. of operational tests costing $500 per hour starting with one plane July 1 and the other Oct. 1, continuing to June 30 next year.

• **Two North American B-45s.** These are four jet bombers. One would be fitted for airworthiness tests and the other would have airways electronics installed. Plans call for 100 hr. of airworthiness tests at $1,000 an hour June 1 to Dec. 31 this year, and 100 hr. operation tests at $1,000 an hour from Oct. 1, 1952, to Apr. 1, 1953.

▶**Who's for It**—Committee members and spokesmen for various organizations gave these reasons for their support of the program:

• **CAA**—Administrator C. F. Horne said it would answer many safety questions about jet plane operation that CAA and CAB must solve. CAA economist Richard Waldo noted that both safety and economic questions were involved, including problems of design speed, fuel reserves, traffic control and jet blast effect at airports.

• **National Advisory Committee for Aeronautics**—J. W. Crowley, Jr., said the program looked "very good" and NACA would support it. He stressed the importance of getting it rolling soon.

• **Aircraft Industries Assn.**—AIA President Adm. DeWitt C. Ramsey, said the sentiment at a recent West Coast meeting of the AIA ad hoc Prototype Committee was that much of the value of the B-45 test proposed earlier had vanished with time, but that test of a commercial jet transport would provide valuable information.

• **Air Force.**—Lt. Col. Marcus O. Owens said the AF is interested in supporting the new program, primarily because of the air traffic control procedures data to be learned.

• **Air Line Pilots Assn.**—Larry Cates said ALPA strongly favors the program in the interests of safety. He cited telegrams to that effect sent by Clarence Sayen, ALPA president, to congressmen last September.

• **Navy.**—Rear Adm. L. M. Grant said it appeared that CAA's request to use F3Ds in the program would receive favorable consideration and CAA probably could get the two planes in fiscal 1953.

• **Air Transport Assn.**—A. W. Dallas said an ATA letter to the committee made it clear that the airlines support the proposed prototype testing legislation. The carriers listed 28 specific questions they need answered before they can complete specifications for a new jet transport design. Once the answers are available, the airlines plan to deal directly with manufacturers to get one or more jet transports built. Dallas said ATA does not want any special subsidy help in the actual building of a jet transport prototype.

• **Civil Aeronautics Board.**—CAB member Joseph Adams said he approves the program—only wishes it could help do something about developing a new short haul local service transport, too.

▶**Nonscheduled airlines**—Amos Heacock, sitting in for the nonsked airlines, said he didn't oppose the program. But he didn't approve it either, he said, because nonskeds believe in developing low-cost freight transports and helicopters as a commercial reserve for the military, rather than luxury jet transports.

All present except Heacock voted for the program. He abstained.

The program now is up to the Budget Bureau. If the Bureau approves, it will go to Congress.

Policy Liberalized On Contract Awards

An order liberalizing Department of Defense regulations on announcement of armed forces procurement contract awards is a return to the policy of a year ago, a Munitions Board spokesman said last week.

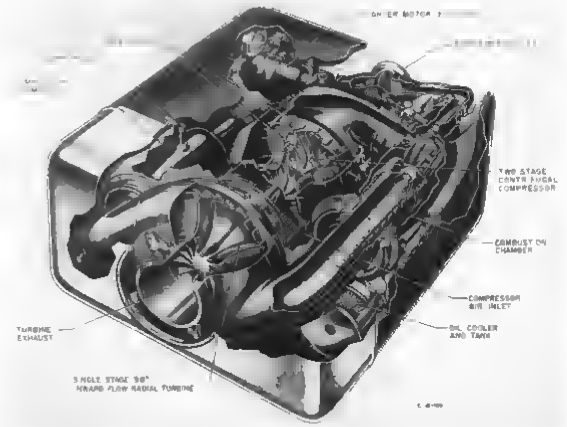
Full information on awards of unclassified contracts will be released by the three military services for all contracts greater than $25,000. Synopses of contract information will be released by the Department of Commerce.

The order followed criticism of previous restriction of unclassified information. For a time this restriction had prevented release of information on virtually all contract awards. Last June the policy was modified to deletion of quantities and dollar amounts for contracts involving more than $250,000. The new order means that contracts above the quarter million limit will no longer be held out.

Munitions Board Chairman J. D. Small said the action was "to make the fullest possible release of military procurement information available to business men who may want to become subcontractors."

Defense Appointee

R. E. Gillmor, vice president of the Sperry Corp., has been appointed as chairman of the new inter-agency Distressed Defense Areas Task Force. Gillmor's assignment will be to direct defense contracts into areas where production cutbacks have created serious unemployment.



News Waits on the Navy

Here—one week late because one branch of the Navy did not know what another was doing—is a photo of the AiResearch gas turbine compressor which was an important part of the story published in AVIATION WEEK, Jan. 21, p. 48.

The manufacturer supplied this publication with photos of two of its devices on the express condition that we would have the photos cleared by Navy security. We submitted them for clearance, which was refused. Accordingly, we did not publish the photos last week although they were an integral part of the story.

We then received a copy of the unrestricted issue "Naval Aviation News" for January and found therein this same photo—cleared for publication in a service magazine, but not in a commercial publication. Despite publication in a magazine that has general circulation, this photo has finally been cleared with reluctance by Navy security.

The photos shows how air enters top of the machine at compressor air inlet, is rammed through the two-stage, centrifugal compressor and some is bled off prior to reaching dual combustion chambers. Thence air spins the inward flow radial turbine and is exhausted. Size of the unit is 15.3 in. high, 31.1 in. long, 25.4 in. wide and takes 7 cu. ft. of space. Weight is 155 lb. dry, electrical requirements, 24-28 v. dc.

Aeronautical Awards Mark IAS Sessions

The Institute of the Aeronautical Sciences will present its annual awards for distinguished aeronautical research at the Honors Night Dinner Jan. 28 at the Astor Hotel, New York. Charles E. Wilson, Director of the Office of Defense Mobilization will be the main speaker. Sessions of the society's 20th annual meeting will extend through five days, Jan. 28-Feb. 1.

These honors will be conferred for 1951 achievements:

• **Lawrence Sperry Award,** to Robert C. Seamans, Jr., MIT's associate professor of aero engineering, for a system of determining a plane's dynamical characteristics and matching them to automatic controls.

• **Robert M. Losey Award** to Ivan Ray Tannehill, U. S. Weather Bureau's chief of synoptic reports and forecasts, for his contributions to the science of meteorology as applied to aeronautics.

• **John Jeffries Award,** to Capt. John R. Poppen, Marine Corps (Ret.), for advancing aeronautics through medical research.

• **Sylvanus Albert Reed Award,** to Edward H. Heinemann, Douglas Aircraft Co., Inc.'s El Segundo division chief engineer, for design and development of experimental aircraft for investigating transonic and supersonic flight.

Highest grade of membership in the Institute—Honorary Fellow—will be bestowed upon:

• **Leroy Randle Grumman,** chairman of board, Grumman Aircraft Engineering Corp.

• **John Hamilton Parkin,** director of

Canada s National Aeronautical Estab lishment

Engineers and scientists at the 11 technical sessions will present papers outlining new developments in aero dynamics, aeroelasticity, structures, aircraft design, electronics, soaring, helicopters, meteorology, safety in air transport, rocket and turboprop propulsion One entire day will be devoted to electronics Noticeably absent from the main topics of discussion is the subject of pure-turbojet propulsion

AVIATION WEEK will print digests of all technical papers presented at the sessions

▶ **Fellowships**—Institute fellowships will be conferred on A T Colwell, Thompson Products, Inc., Leo J Devlin, Douglas Aircraft Co, Robert R Dexter, Institute of the Aeronautical Sciences, Harold D Hoekstra, CAA, Nicholas J Hoff, Polytechnic Institute of Brooklyn, Hans W Liepmann, California Institute of Technology, Maj Gen Donald L Putt, USAF, Daniel Sayre, Princeton University, Ernest G Stout, Consolidated Vultee Aircraft Corp, and Walter G Vincenti, NACA

Review Profits

- **New Renegotiation Board is set up by Defense.**
- **And 4 regional offices will aid contractors.**

Effective as of Jan 20, the new Renegotiation Board assumed control over renegotiation of all the aircraft and other defense contracts subject to the 1948 act, John T Koehler, Board Chairman has announced. The new arrangement involves delegation to the board of powers and functions which the Secretary of Defense formerly held under the 1948 act

Koehler said that military renegotiation regulations under the 1948 act continue in effect, with the amendment that the Renegotiation Board would be considered the delegate of the Secretary of Defense Thus it will mean that all defense contract renegotiation operations will be placed under the board, simplifying matters for manufacturers with contracts subject to both the 1948 and 1951 Renegotiation Acts

▶ **Transfer**—Defense Secretary Robert Lovett has transferred available personnel, records and unobligated funds of the Military Renegotiation Policy and Review Board the Armed Services Renegotiation Policy and Review Board and the Armed Services Renegotiation Board and its three divisions to the Renegotiation Board

Four regional offices are being set up for the board, with a five-man regional board and staff at each office These offices will be principal contact points with defense contractors in renegotiation proceedings aimed at stripping excess profits from defense contracts Financial statements made by contractors to the national board in Washington will be assigned to the regional boards for action

Following are the regional board organizations

- **Washington,** Rizik Bldg, 1737 L St NW: Walter H Dupka, chairman, formerly Director of Accounting for Consumer Durable Goods, OPS and member of executive committee of Jones & Laughlin Steel Corp Richard B Cross, Navy member Thomas Cogeshall, Air Force member, Alex S Watt, Army member James F Lynn, General Services Administration member
- **New York,** John Wanamaker Bldg Howard B Smith chairman, former treasurer of New York Federal Savings and Loan Association Air Force member not yet named Harrison Lillibridge, Navy member; John W Flynn, Army member C H P Yallallee, GSA member
- **Chicago,** New Post Office Bldg chairman not yet named, Stuart C Ross, Air Force member; E L Johnson, Navy member, Douglas W Winfree, Army member; Charles W Dodd, GSA member
- **Los Angeles,** 5504 Hollywood Blvd. Hayward L. Elliott, chairman, former director of Los Angeles office, Air Force division, Armed Services Renegotiation Board, Rex Dibble, Air Force member; Wilfrid J. Geoffrey, Navy member, John A. Rice, Army member, and Hayward C Thomas, GSA member

More Magnesium

An increase of 8,000 short tons over 1950 primary magnesium ingot production will be available to aircraft and other manufacturers by the beginning of 1953

Defense Production Administration said reactivation of six government-owned stand by plants mothballed after World War II has increased ingot capacity to where 131,500 tons will become available by 1953—29,500 of which will come from the Dow chemical plant at Freeport, Texas, and 102,000 of which will be produced in the six government plants

DPA said primary and secondary magnesium ingot production in 1953 is scheduled at 145,300 short tons—about 12,000 short of the World War II peak figure of 157,000 in 1944

Aircraft Backlog $10 Billion

Aircraft industry net sales were running at an annual rate of nearly $2 8 billion during the third quarter of 1951, it is disclosed in the third-quarter backlog and sales report issued by the Census Bureau and Civil Aeronautics Administration, while the industry's backlog on Sept 30 had soared to more than $10 billion for both military and civil

This report furnishes the first statistical benchmark on the progress of the aviation rearmament program since the beginning of the Korean conflict The last such report was issued by Census in September of 1950 and covered the second quarter of that year ending June 30 Although the information has been collected regularly since then, Defense Department security regulations have forbidden its publication

▶ **Backlog Grows**—Possibly indicating the slow rate of production third-quarter 1951 sales of $898 million were only 9% of the backlog, and net new orders added during that period constituted 20% of the $10,468 million backlog in force on Sept 30 Of the total backlog on Sept 30, military aircraft and parts accounted for $6,067 million, military engines and parts accounted for $2,520 million, and military propellers and parts were valued at $207 million

The total aircraft backlog, for airframes and engines both civil and military, has grown in this way, according to the Census report June 30, 1950—$2,988 million, Sept 30, 1950—$4 788 million, Dec 31, 1950—$5,039 million Mar 31, 1951—$8,068 million June 30, 1951—$9,275 million, and Sept 30, 1951—$10,468 million

▶ **Subcontracting**—The report also gives an indication of the growth of subcontracting, at least to companies also producing airframes On Sept 30, 1950, subcontracts of this nature were valued at $55 million Nine months later, on June 30, 1951, this figure had risen to $171 million And by the end of last September, subcontracts to other airframe manufacturers had soared to $425 million All these figures are included in the total backlogs for the respective periods

Cutback Is On

- **New meeting called to revamp air schedules.**
- **Both lag in production, politics are blamed.**

By Alexander McSurely

The question of how much of the shove back of the 1953 aircraft schedules was due to President Truman's budget curtailment and how much was due to inability of the aircraft industry to meet its original schedules, last week was creating a major-sized argument in Washington and in aviation production centers of the nation

Most aircraft manufacturers were willing to tell you that they could have met the original schedules, and that the cutback of schedules was strictly political

▶ **Another Session**—On the other hand government spokesmen still maintained that the slash of approximately 30% from the peak schedules for aircraft and approximately 60% from the peak engine schedules was "just a realistic adjustment to facts

Following the Pentagon meeting of the top aircraft industry brass held Jan 16, the working level aviation industry operators were called for a second meeting Jan 24 and 25 at Air Materiel Command headquarters Wright Patterson AFB, Dayton, to get more specific word on what the rollbacks of schedules to mid 1955 realization, or even later will mean material-wise to their individual companies

Col Kern D Metzger, chief of Industrial Resources division, AMC was to preside at the two-day session at which some 125 industry representatives were called Besides going through the controlled materials assignments for engines and airframes the meeting was to take up the ticklish question of how to get better materials provision for so-called B Products components which have been handled through DPA and NPA

▶ **More Changes**—Push is on to get the components an equal materials priority with airframes and engines, since no airplane is complete without the components Reports are that the way already has been greased to put the components materials assignment under Aircraft Production Resources Agency at AMC, along with the materials program for engines and airframes

Further analysis of the shove-back of aircraft schedules, indicates that obviously there will be some changes in actual aircraft programs, in addition to the mere stretching-out of existing schedules With approximately 18 months' lag in the new schedule for full realization of the production originally planned to be completed by 1954, it is obvious that some older airplanes are going to be phased back or out, while newer jet types are going to come into production in this same period

The fact that none of the production schedules will reach the peaks previously planned will also mean that the business of phase-out of the older types and phase-in of newer planes, will be simplified

Navy Gets Robot Carrier Pilot

An automatic steering system which will maintain aircraft carriers on a prescribed course, or cause them to maneuver according to pre arranged plan, has been recently accepted by the Navy. The new shipboard robot pilot was developed by Sperry Gyroscope Co and will soon be installed aboard the U.S.S Oriskany for service tests

The robot pilot's ability to steer automatically any required course that might be required in tracking down targets or in evasive maneuvering appears to be a big advantage Another is its ability to hold the ship on heading without the wander that normally comes with human fatigue Deck personnel can steer the ship from small remote stations which are carried on shoulder straps

▶ **Magnetic Amplifiers**—The shipboard autopilot' uses magnetic amplifiers instead of vacuum tubes which are currently used in aircraft autopilots. The ruggedness of magnetic amplifiers appears to justify any weight penalty involved when used on shipboard, where "ounces" are not regarded as critical considerations

Like modern aircraft autopilots the new ship robot pilot uses rate derivative signals to provide smooth deadbeat heading control. An integrator compensates for wind effects and provides what in aircraft language would be called automatic crab angle

Shipboard robot pilots predate their airborne equivalents having been used on merchant vessels as early as 1921 However they are not standard equipment in Navy combat ships At present fewer than nine naval combat vessels carry them

Last summer, General Electric announced that it had delivered an automatic ship's steering system to the Navy for trial installation on a destroyer. This, coupled with the announcement of the Sperry equipment may indicate a trend toward the wider use of robot pilots on Navy combat vessels

AF Pushes Forge Press Programs

Pressure to speed up the Air Force's heavy forge and extrusion press program for aircraft production was turned on last week as Col. Wilbur (Nick) Carter, chief of Industrial Services Section, AMC, was assigned to head a special Heavy Press Committee in Washington to trouble-shoot and expedite the progress of the presses through to full production stage

Meanwhile, Heppenstall Co, Pittsburgh, was assigned a $1 5 million contract to make heavy die blocks at the old Navy plant at Eddystone, Pa., freeing capacity of other die block manufacturers for the big dies needed in the forge press program

Definite press assignments announced thus far include Kaiser Aluminum Co. Newark, Ohio plant, two forge presses of 35,000 and 25,000 tons. Kaiser Aluminum's Halethorpe, Md plant gets two 8,000 ton extrusion presses Reynolds Metals plant at Phoenix, Ariz gets two presses of 35,000 and 25,000 tons

Wyman Gordon Co., Alcoa, Harvey Co, and Dow Chemical Co are other companies expected to get big forge presses, while Bohn Aluminum and Brass Co. Curtiss Wright Corp, Reynolds Metals, Alcoa and Harvey are also expected to get extrusion presses Other companies mentioned as possible participants in forge press operation for the Air Force are Ladish Co. Cudahy, Wisc. Cameron Iron Works, Houston, Tex., and Taylor Pipe and Forge Co, Chicago

While the program was originally described as a $210 million program, industry estimates are that it will run close to a half billion dollars by the time supporting facilities such as heat treating and die sinking facilities are provided.

Midwest Contracts Continue to Climb

USAF prime contractors were due to receive another large slice of defense contracts at the end of November, with over $364 million worth covering 1,153 AF contracts Up to that time, firms in the Chicago region, which includes northern Illinois and Iowa, had a total of 2,060 contracts valued at well over $2 5 billion

Payments due Chicago region firms were up from $136.5 million at the start of 1951. Last January, Midwestern Procurement District businesses held $388 8 million in AF defense work

A Defense Appeal Scrap for Steel

Expansion Progress Report

	AIRCRAFT	ENGINES AND PARTS	AIRCRAFT EQUIPMENT
Cost of facilities	$53,954,000	$339,496,000	$74,733,000
Estimated value in place 12/31/51	$36,196,000	$136,611,000	$32,381,000
Percent in place 12/31/51	67 %	40 %	43 %
Percent construction in place 9/30/51	46.7%	26.6%	25 %
Percent equipment in place 9/30/51	52.6%	35.7%	53.4%
Value of projects completed 9/30/51	$ 1,756,000	$ 2,125,000	$ 9,433,000
Value of projects completed 9/30/51 as percent of total	3.3%	0.6%	12.6%

SOURCE: DPA's progress report on industrial expansion covered by certificates of necessity issued through Sept. 30, 1951

Air Plant Expansion Progressing

Defense Production Administration reports that as of Dec. 31, 1951, about two thirds of the facility expansion for U.S. airframe plants, ordered under the original Korean emergency broaden-the base program, is now actually put in place.

Expansion of the aircraft engine facility program on the same basis is about 40% complete, and of the aircraft equipment industry about 43% complete, measured by dollar value of bricks, mortar and other facilities now already placed.

▶**Near Average**—It will take until the end of 1953 before the expansion program is completed.

(The report does not reflect recent decisions to expand the Air Force to 143 wings. Neither does it reflect any chances that may be in the works that would stretch out mobilization.)

The aircraft industry expansion programs aren't too far from the average for all the $10 billion of industrial expansion covered by DPA's report.

Some 46% of the value of the whole program was expected to be in place on Dec. 31, 1951. On the other hand, the expansion of output of aluminum ingot—a key factor for aviation and the whole arms program—is barely off the ground, the report indicates. As of Dec. 31 only 27% of the $586 million dollars of expansion was expected to be in place.

▶**Individual Reports**—However, close to half the $600-million aluminum program was to be completed by mid 1952, and most of the balance by the end of the first quarter of 1953. Again, these figures do not include any increase in the expansion goals that may come as a result of re-figuring the future demand for aluminum.

The DPA report, titled "expansion progress, projects under certificates of necessity," is based on individual reports received from 3,523 companies receiving certificates of necessity, representing about 94% of the approximately $10 billion worth of expansion aided by the tax certificates.

A companion report on certificates of necessity issued through Nov. 30 shows the following:

- **Aircraft.** A total 52 certificates issued on facilities estimated to cost $84,011,000, the five-year write-off on costs allowed for 66.6% of the total cost of the facilities.
- **Aircraft engines and parts.** 140 certificates issued for facilities estimated to cost $367,795,000, with an average of 69.4% of the cost given the accelerated amortization.
- **Aircraft parts and auxiliary equipment.** 198 certificates issued for facilities estimated to cost $102,041,000, average five-year write-off allowed being 65.8%.
- **Aircraft propellers and propeller parts.** 14 certificates issued covering facilities estimated to cost $13,255,000, percentage getting the five-year amortization 69.4%.

Airline Wage Board To Hear Complaints

If airline management and unions have any complaints about how wages in the industry are being controlled by the Railroad and Airline Wage Board, or any suggestions for improvement, they may express them to the Board in Washington at a hearing Feb. 7 and 8.

The Board had ruled on 32 airline wage increase applications by Dec. 31 and has 63 applications on hand. It is applying Reg. 1, issued Nov. 27, and following most of the rules of the Wage Stabilization Board.

Crash Won't Stop Valiant Production

(*McGraw Hill World News*)

London—The prototype Vickers Valiant, Britain's four-jet atomic bomber, was destroyed near Bournemouth by a fire in the port engine bay and a subsequent explosion. Four of the five-man crew which was engaged in flight testing the craft bailed out successfully.

The Valiant, on flight status since May 18, 1951, was nearing the end of its flight test program, and the Ministry of Supply says that the crash won't change production plans for the plane. But it may be more than a year before the second prototype flies, and this could set the production schedule back by that amount.

The accident probably kills all British chances to sell the plane to the United States.

Lately, there has been considerable speculation (mostly in the British aviation press) that USAF top brass were interested in procuring the Valiant to bolster U.S. bomber forces. No official comment has been made on either side of the Atlantic concerning this phase of Valiant production.

Four Rolls-Royce Avon turbojets power the plane. Its speed is said to be above that of the Canberra (a member of the 600-mph. class) and it has far greater range and bomb capacity. Dimensions and detailed performance are not available, but ceiling of the craft is given as 55,000 ft.

Upwards of 25 Valiants are on order from the Weybridge works of Vickers-Armstrongs Ltd. Cost of the prototype which was lost was about $2.1 million.

AF Tools Available At Marietta Plant

There still are 2,500 machine tools left at the Air Force reserve pool open to contractors at Marietta, Ga., they've been moved from the Lockheed B-47 plant to a near-by concrete ramp.

From five to six contractors a day are picking them over and going away with an average of one to three tools each.

The tools are protected by a spraying of USAF black preservative, and the electrical components are wrapped in waterproof paper shrouding before the spraying. On top of all this go tarpaulins.

Meanwhile, the Corps of Army Engineers is building warehouse at near-by Dobbins Air Force Base to house the remainder of the 2,500 tools now on the ramp.

Engineering the Cutlass Afterburner

- **Unit has come far since 1948 flight in F6U-1.**
- **But engineers had to lick many combustion problems.**

F7U-1 CUTLASS shows Solar stainless steel afterburner compartment.

Today the afterburner is accepted as an integral part of the power scheme of the jet engine. But like other far-reaching developments in the field of aeronautics, this added component to the basic jet powerplant didn't come quickly and easily.

Development of this extra high-thrust package has been accompanied by a noticeable paucity of released data. But the door to the subject was opened wider at the recent National Aeronautic Meeting of the Society of Automotive Engineers, at Los Angeles. Details of development and operation were revealed by Harold O. Adrion of Chance Vought Aircraft division of United Aircraft Corp. in his paper "Installation Experience with Turbojet Afterburner Power Plants."

▶ **F6U-1 First**—First production airplane to incorporate an afterburner was Chance Vought's F6U-1. In the summer of 1947 an intensive study was initiated to determine best possible means of providing more thrust for the plane. Choice narrowed down to a larger basic engine or the same basic plant equipped with afterburner.

> **For the same static thrust the afterburner engine was lighter, plane's radius of action was the same or greater, and time to climb to altitude was about half that with the larger basic engine.**

After ground runs in March, 1948, the first afterburning flight was accomplished the following month. In the succeeding months various developmental difficulties were overcome, and with the exception of starts at altitude, a satisfactory experimental powerplant installation was obtained.

In November, 1948, the experimental plane was damaged in a wheels up landing and afterburner flight development was delayed until August, 1949, when the first production plane was available for powerplant tests. The afterburner used in the F6U-1—and also in the XF7U-1—was designed, built and developed by Solar Aircraft Co.

▶ **Afterburner Makeup**—Describing the general arrangement of the afterburner, Adrion explains that three essentials are required for high combustion efficiency in any moving gas stream: high burner inlet temperature and pressure and low gas stream velocity.

Engine design fixes the temperature and pressure of the exhaust and little can be done to alter these two conditions to boost afterburner combustion efficiency, he says. But to lower the velocity of the gas before the burning in the afterburner, a diffuser is installed just downstream of the exhaust collector located immediately downstream of the turbine. Then there is a burner ring and a sufficient length of combustion chamber to insure that all injected fuel will be burned.

When the fuel is ignited and burned in the exhaust gas, expansion occurs. To maintain the same mass flow through the system, the exit area must be increased. In many afterburners, this is done by the use of "eyelids" or "clamshells."

Initially, Adrion relates, attempts were made to start the afterburner with the eyelids open, but this wasn't successful—probably because of reduced pressures in the afterburner. So the start was made with the eyelids closed.

A cockpit master switch, through which passed all circuits for controlling the afterburner, was first energized, then the ignition switch was actuated to spark the two-electrode combustion-chamber plug, followed by throwing the fuel pump switch which also opened the delivery valve. With fuel burning, the back pressure on the engine increased and turbine temperature and pressure rose rapidly. The pilot detected these rises on his instruments and actuated another switch to open the eyelids. This completed the starting procedure. Shutdown was by closing off the fuel, then closing the eyelids. Fuel control also was manual.

Designs were carried out to simplify the starting procedure and control the afterburner fuel flow automatically. Paralleling the development of the controls, the afterburner itself was improved as a result of the flight program. The automatic controls for afterburner start and shutdown were developed by Solar. Automatic fuel controls were developed jointly by Solar, the Manning, Maxwell & Moore Co., and Chance Vought. The Navy's Bureau of Aeronautics backed this entire afterburner program.

▶ **Ignition Factors**—First problem in the development of the starting controls was to get the spark in the right place

at the right time. Initially, starts were made by sparking first, then introducing the fuel. Accidental reversal of this procedure established the first "don't" because of the "enthusiastic" start encountered.

Dual ignition was found to be more reliable than single at various speed and altitude conditions for which fuel-air ratio varied from place to place around the burner ring. It was occasionally necessary to replace coils, and high tension leads would sometimes burn and short. The ignition plug, located in the hot gas flow just downstream of the burner ring, also burned out from time to time.

One of the interesting disclosures of the development studies, discloses Adrion, is that despite the varying amounts of fuel introduced into the exhaust gas, spontaneous ignition of the fuel was never attained.

During engine accelerations the flame from the engine combustion chamber would extend back through the turbine into the afterburner. This, it was discovered would ignite the afterburner fuel. The principle has been developed into an afterburner ignition system—hot streak ignition.

Adrion says that a small shot of fuel injected into the engine combustion chamber just ahead of the turbine ignites and the resulting flame extends back—through the turbine into the afterburner where it ignites any fuel present in the latter area. Caution must be exercised in this procedure, he says, because use of more than a minimum amount of fuel may cause turbine burnout.

▶**Eyelid Control**—Three possibilities were considered for opening the eyelids automatically following the afterburner start.

- When the afterburner started with the eyelids closed, turbine back pressure and temperature both jumped rapidly.
- When fuel is added to a moving stream and burned a pressure drop (momentum pressure drop) occurs across the combustion chamber. This drop existed in the afterburner only during burning and was thus available as a signal for eyelid opening.
- The third approach could be with fast response thermocouples, but these were not available at the time.

Increase in pressure level alone could not be used—pressure increases were also experienced during engine accelerations and a false eyelid signaling indication could be given. The initial eyelid-opening-signal switch felt the momentum pressure drop of the afterburner, and this response system met with early success and was subsequently used for all afterburners, says Adrion.

Another important operational detail was to have the eyelids close again after the afterburner was shut off, to prevent the engine thrust loss that would result in the open position. This closing was accomplished by electrical relays. And to cope with afterburner pump failure or afterburner blowout, the eyelids again had to be closed immediately. The same pressure switch sensed the reduction in the momentum pressure drop resulting from the loss of combustion and again operated to shut the eyelids.

▶**Operation of Controls**—Here's how the fully developed starting controls operated. First, the pilot would advance the throttle beyond the high-speed stop into the afterburner detent. This action, through a Microswitch and a series of relays started the fuel pump, opened the fuel valves, and energized the igniter plug. The fuel ignited and the pressure switch felt the sudden momentum pressure drop. This action by the switch opened the eyelids and shut off the ignition, completing the starting cycle.

Starting sequence from the time the pilot advanced the throttle into the detent until afterburner eyelids opened, says Adrion, consumed less than 1 sec.

The eyelid is the most common area-varying device in use. Because the

closed position of the eyelids forms the basic engine nozzle area, this area must be held repeatedly within very close limits after each afterburner shutdown to insure that the military power area is maintained, reports Adrion.

Asbestos and Inconel wire braided seals had to be applied to prevent leakage of exhaust gases and these required careful maintenance. A recent development has been the flap or finger type nozzle.

▶**Automatic Fuel Control**—Studies showed that within certain limits the afterburner fuel flow required was approximately proportional to the pressure level of the engine. It was seen that this was true for the condition of constant turbine temperature which is the desired operating condition for the basic engine.

Since this engine pressure-afterburner fuel flow relationship was only approximate, it was necessary, says Adrion, to use a temperature control trimming system. This trimmer felt the turbine discharge temperature and amplified it to control a bypass valve in the fuel system.

In general, this control has met with considerable success and has been comparable to the basic engine fuel controls as regards maintenance and serviceability. In the initial stages of the program, the electronic amplifier was the cause of some difficulty. However, redesign and refinement resulted in a completely acceptable unit. Thermocouple rejection in the early days was quite frequent, but redesign has cut down the number of rejected units.

Initially, an electric motor driven gear pump was used. This type proved satisfactory until the afterburner fuel flow requirements started to get so enormous for the redesigned and new type afterburners. Current drain on the engine-driven generator became so high that another type pump had to be used.

An air turbine-driven pump is now being utilized, which bleeds air from the compressor for its operation. Though the capacity of this type pump seems adequate at present, says Adrion, the tendency for it to be slightly slow in getting up to speed will have to be remedied to improve the elapsed time for the afterburner start.

▶**Mountings Critical**—One installation item which required considerable judgment was location of the various control components throughout the airplane. Unlike the basic turbojet engine fuel control which is contained in one unit, the afterburner fuel control that was developed was made up of several different units, each having its own peculiarities regarding installation.

Thus, the temperature control amplifier had to be shock mounted in such a position that catapult and arrested landing accelerations would not affect

its performance, it had to be accessible for minor adjustments, a relatively cool location was required and mounting had to be in as quiet a spot as possible because of the destructive effect of excessive noise and vibration on vacuum tubes.

The pressure switch also had to be located with its axis mounted crosswise to minimize the effects of catapult shots. It had to be located high in the airplane to eliminate water traps in the pressure lines but at the same time had to be positioned in a relatively cool location.

> This general mounting problem will be with us as long as the inside of a high-performance fighter has the spaciousness of the "proverbial sardine can," says Adrion.

▶ **Big Wind**—The problem of the ignition and combustion of fuel in a high velocity air stream is probably the most fundamental of all the problems involving afterburner development, Adrion contends, and only by a determined attack on this item can the full possibilities of the afterburner be realized. The simple example of trying to light a match in a breeze is a good analogy of the problem of afterburner ignition, he points out.

Reduction of velocities in the afterburner combustion chamber is subject to strict limitations, to keep the airplane frontal area as small as possible. Also, since diffuser effectiveness decreases as the diffuser included angle increases beyond a certain value (about 8 deg.), length of the afterburner must also increase as the diameter is increased.

▶ **Combustion Problems**—One of the methods used to increase combustion stability and efficiency, reports Adrion, is the use of a so-called flame holder downstream from the burner to create regions of low velocity gas. Although this is quite effective, a drawback exists in that the thrust at any rpm, with the afterburner off is cut down by any such protuberance in the tailpipe or afterburner.

The optimum design is arrived at by careful balancing of size, distribution of fuel, detail design of the flame holder, and careful attention to all other details.

Many experiments and tests were made to determine the proper distribution and introduction of fuel into the afterburner. In certain designs the fuel was injected upstream and in others downstream. Still other designs had the fuel injected cross-stream, and in certain burners all combinations of these schemes were tried. Adrion reports that at any given altitude the engine pressure level increased as the airspeed increased. Thus, the afterburner perform-

ance and combustion efficiency was generally improved at high flight speeds.

It was also discovered that afterburner blowout altitude was a function somewhat of the exact boost thrust ratio. The higher the boost the poorer was the blowout performance.

▶**Burner Ring Details**—The burner ring usually consists of a number of small drilled tubes ranging in size from ¼ to ¾ in. in diameter in a grid pattern across the afterburner. Thus far, no complicated arrangement or duplex nozzle has been utilized. One of the problems with the fuel ring, reports Adnon, has been the clogging of the orifice holes. Poor starts and combustion are obviously the result of this, he says. Design changes to eliminate the dripping of residual fuel in the ring after shutdown have largely eliminated this problem.

Very careful attention had to be given to design of the burner ring to take care of the differential expansion resulting from running cold fuel through the ring while the afterburner shell temperature ran at 500-600C. In the development of a satisfactory flame holder, several interesting problems were encountered. Burners which might give satisfactory flame-holding characteristics would cause very rough combustion or perhaps a high pitch scream, either of which could be destructive to afterburner "tinware."

Even the smallest change in the design of the flameholder might cause large changes in combustion performance, Adnon says. Actually the development and design of the burner and flame holder were inter-related and the performance of either would be dependent upon detail design of the other.

▶**One Moving Part**—The only mechanism of the afterburner is that required to operate the eyelids. Proper lubrication of the linkage, rollers, etc., has always been a problem because of the intense heat to which they are subjected. It was found that dry operation of the mechanism gave the best results, the primary problem being one of caking of any lubricant and the collecting of dirt.

The operating mechanism for the eyelids is all self-contained on the afterburner, or in a few cases, partly on the engine, and there is no need to make linkage connections or push rod arrangements operate between the afterburner and the airplane structure.

Diffuser, burner ring, burning section and eyelids are all subjected to vibration, and the last two components meet extremely high temperatures. Most persistent tinware problems involved failed spotwelds and cracks in the seam welds and lighter sheet metal parts, particularly the shroud assembly—the heat shield around the afterburner that protects the structure and forms one of the components of the cooling air pump (the ejector). Upping the gages and substituting harder materials, says Adnon, has given afterburner tinware that shows up free of cracks, but gages allowable are limited by weight considerations involved.

▶**Cooling, Mounting**—Forward end of the engine compartment is generally cooled by using boundary layer bleed-off or by air bled from the main inlet duct. For the afterburner compartment cooling air is taken from the outside of the plane through gills or scoops, is pumped through the compartment by the jet of the engine and afterburner. This jet pump is formed by extending the cooling shroud beyond the exhaust nozzle exit.

Two types of cooling problems were encountered, Adnon reveals. First was leakage of hot gas into the afterburner compartment, raising the temperature of the compartment and structure by convection, second was effect of leaks on the operation of the jet pump. It was found that any leak that allowed hot gas to flow across the jet pump's normal flow path sharply cut the effectiveness of the pump, as well as heating the compartment abnormally by convection. Compartment pressure also had to be controlled so as to prevent blowout or collapse of the panels.

Primary mount of the afterburner is simple—either a top center mounted roller or trunnions on opposite sides at the centerline. Connection of afterburner to the engine exhaust collector is by a quick disconnect clamp. Adnon reveals that to minimize the bending loads imposed on the engine by the afterburner, a flexible section is installed in the forward section of the latter, which will take shear loads only.

In general the complete afterburner weighs about 25-30% of total engine weight, and the configuration for present-day engines can be handled by a relatively small crew without need for elaborate hoisting mechanisms.

After installation of the afterburner only a few fluid and electrical lines need be attached. The unit's fuel system ties in directly to the plane's normal fuel supply.

One serious problem encountered early in the program was engine overspeed during the transient condition of eyelid opening or afterburner shutdown, because of the characteristics of the flow type engine control then in use. However, introduction of the flyweight type of basic engine control held rpm very steadily during the transient conditions.

▶**Small Penalties**—Effect of the afterburner on the turbine has been negligible, Adnon reports, and does not alter the frequency of engine inspections and

AVIATION WEEK, January 28, 1952

Global Transports

Pratt & Whitney T34 Turboprop Engines to Power Top Air Force and Navy Transports

TRANSPORT AVIATION is soon taking another giant step forward.

Two of the world's biggest air transports will be converted to propeller-turbine power, and when they are flying they will be able to achieve greater speeds and greater economy of operation than ever before possible. These aircraft are the Air Force's huge Douglas C-124B Globemaster, and the Navy's new Lockheed R7O Super Constellation.

Both will use the Pratt & Whitney T34 axial-flow propeller-turbine engine rated at 5,500 horsepower. With this rating it stands alone today as *the most powerful single turboprop unit known to be in operation in the U. S. or abroad.*

The T34 Turbo-Wasp will boost the payload of both aircraft substantially over piston-powered versions. In the case of the Navy R7O the payload will increase to approximately 35,000 pounds, and in the Air Force C-124B to about 75,000 pounds.

Along with these increases in load-carrying capacity, speeds for both of these big transports will be very substantially increased. And due to the tremendous power of T34 Turbo-Wasps, both aircraft will be able to operate comfortably from 5,000-foot runways common to both commercial and military airfields.

Pratt & Whitney Aircraft

ONE OF THE FOUR DIVISIONS OF
UNITED AIRCRAFT CORPORATION
EAST HARTFORD, CONNECTICUT

overhaul. Added vibration imposed by the afterburner did make it necessary to boost the strength of the exhaust collector.

No additional powerplant instrumentation was required to take care of afterburner operation—pilot had only to be careful not to exceed top engine rpm or turbine temperature limit. Engine fuel control held rpm at top allowable value satisfactorily, and afterburner fuel control kept turbine temperature to very constant values during normal afterburner operation.

Adrion reveals that afterburners have been operated for as much as 10 12 min with no damage to engine or afterburner. Broadly speaking, he says, the afterburner can be used at any time, for any duration during flight, with the only limit on operational time being the plane's fuel supply.

Small But Mighty

AiResearch has developed an air turbine jet engine starter that delivers 140 hp., yet weighs only 35 lb. Heart of the unit is a high-speed turbine spun by hot (700 deg.) gases. Included in the 35 lb. package are reduction gears, automatic engaging mechanism and necessary controls, the Los Angeles manufacturer states.

Norden School

- **Servicing complex bomb directors is a tough job.**
- **So company has set up post-grad 'university.'**

The electro mechanical systems of the new Norden bomb director are complicated And so is the servicing of these directors

They are so complicated, in fact, that Norden Instruments, Inc has set up a "little university" to train graduate engineers in post-graduate techniques in order to make field engineers out of them

Planning began a year ago, when the Norden people realized that the level of engineering knowledge required for servicing the new director would be far above that required for the famed bombsight of World War II.

The new director uses UHF devices plus specialized electrical and mechanical components, knowledge of these would normally be confined to the engineers who had designed, developed and lived with the director project. But these men were needed in the design rooms, and would weaken the design staff if they left to become field engineers

▶ **Campus at Avon**—Navy's BuOrd and Norden started a training program and set up a center at Avon Old Farms School in Avon, Conn Engineering graduates with higher mathematics qualifications were recruited from major colleges in the East.

The courses began during the summer of 1951, with a six-month curriculum which emphasized electronic circuitry and servomechanisms After completing theoretical studies, students were instructed in practical understanding of each component and its place in the system

Trainees and instructors were quartered at Avon during the course. Plant services and equipment were provided by the Navy and by Norden's specialists who were responsible for the design of the individual componets

After the six-month training period, the students spent two additional months in the field at Navy facilities They worked under conditions usually found in the field and under continuing guidance by instructors After this on-the-job training period, they were released to field service

▶ **Dividends**—Norden's program has now reached the pay-off stage

Qualified engineers are available for duty and have been placed in strategic locations which have been specified by BuOrd

Norden's second program is under-

way, and the third is scheduled to start in June of this year.

Norden Instruments, Milford, Conn., currently is producing an initial order of the bomb director and is also making engineering studies for the quantity manufacture of the system.

NACA Reports

(NACA Technical Notes are informal papers printed in limited quantities for domestic use only. They are obtainable free of charge, only by persons having a professional interest in them. Write to Division of Research Information, NACA, 1724 F St., N. W., Washington 25, D. C.)

▶ **Heat Transfer to Bodies in a High-Speed Rarefied-Gas Stream (TN 2438)—By Jackson R. Stalder, Glen Goodwin and Marcus O. Creager**

One of the largest areas for exploration in the field of aerodynamics is that of heat transfer to bodies in a high-speed rarefied-gas stream such as occurs for a missile flying at high altitudes and speeds. A series of cylinders was tested in a stream of rarefied gas for a range of Knudsen numbers and Mach numbers. (The Knudsen number is the ratio of the molecular mean free path to the diameter of the cylinder). These tests were made in the Ames laboratory low-density wind tunnel.

The data for transverse cylinders lead to the following conclusions:

- **Fully developed free-molecule flow** occurs for Knudsen numbers of two and higher.
- **Temperature-recovery factor** exceeds unity for Knudsen numbers greater than 0.2, even though free-molecule flow is not fully developed.
- **Temperature recovery factor** primarily depends upon the Knudsen number.
- **Theory and data show correlation** for free molecule flow with the accommodation coefficient equal to 0.9.

▶ **Skin Friction of Incompressible Turbulent Boundary Layers Under Adverse Pressure Gradients (TN 2431)—by Fabio R. Goldschmied**

This report was prepared to assemble and to review critically the available information concerning the skin-friction trend of an incompressible turbulent boundary layer. A graphical form is used to present experimental data for turbulent boundary layers under adverse pressure gradients from several sources.

Data obtained by the momentum balance method are shown to follow a trend opposite to that of data obtained by hot wire and heat transfer methods.

The author concludes that the momentum method is of questionable value in regions of adverse gradients.

He says it should not be relied upon because the sensitivity to measuring errors and to flow deviations is too great. He introduces a new integral energy parameter and demonstrates its relation to skin friction data.

► **Theoretical Aerodynamic Characteristics of Bodies in a Free-Molecule-Flow Field (TN 2423)—By Jackson R. Stalder and Vernon J. Zurick**

The aerodynamics of bodies at extremely high altitudes is considerably different from the sea level case. This is because air is no longer a continuous medium with respect to the body, but rather a succession of individual molecules. Trouble begins when the molecular mean free path (which is the average distance between molecular collisions) gets to be about the size of some particular dimension on the body.

Because of this dimensional dependence, the physical limits of the region vary. However the altitudes involved are on the order of half a million feet and up.

This report covers an investigation of the aerodynamic coefficients of a flat plate, cylinder, sphere and cone. Calculations are performed for a series of molecular speed ratios (defined as the ratio of stream speed to most probable molecular speed) ranging from 0 to 20. The family of cones investigated included semi vertex angles from 2.5 deg to 30 deg. Their coefficients were calculated for angles of attack between 0 deg and 60 deg.

Two types of molecular reflection were assumed—specular and diffuse. For conical surfaces, a third type of molecular reflection was calculated. In this type, impinging molecules are not emitted from the body, but are swept along its surface.

For a flat plate, the lift-drag ratios are very small for diffuse reflection. They decrease as molecular speed ratio increases. At high speeds, lift-drag ratios are more favorable at small angles of attack than at large ones.

► **Method of Determining Initial Tangents of Contours of Flow Variables Behind a Curved Axially Symetric Shock Wave (TN 2411)—By George P. Wood and Paul B. Goodenum**

Given the location and shape of a curved, axially symmetric shock wave, this report sets out to derive a method for calculating initial tangents of flow contours. The method was applied to the flow about a sphere at a Mach number of 1.62.

The initial tangents of density contours which were obtained faired well into contours determined from interferograms for the flow pattern.

Streamlines and contours of constant Mach numbers throughout the field have also been deduced.

Metal Honeycomb Replaces Ribs, Stringers

- **Northrop lessens weight in control surfaces.**
- **New method gives high strength weight ratio.**

HONEYCOMB 'log' (left) ready for bandsaw, and (right) a core is finished on mill.

Low weight is getting the emphasis in a Northrop Aircraft scheme for control surfaces on highspeed planes. Aluminum (3SH) honeycomb core material is being substituted for the conventional rib and stringer makeup.

Because weight is a critical factor in control surface operation, the honeycomb construction has much to recommend it as a solution to the problem of developing light and extremely strong semi monocoque thin-skin structures. It combines high strength weight and stiffness weight characteristics.

Originally, Northrop applied this development to the makeup of elevons—control surfaces combining the action of ailerons and elevators. But little was known of production processing methods for a feasible fabrication approach. So Northrop's process research engineer, Robert J. Patton, teamed with factory personnel to work out relevant details—best machining methods, adhesives, spray techniques, cleaning methods, curing cycles, tooling and other factors.

► **Comes In Logs**—The 3SH aluminum core material is received from the vendor in block forms measuring 17 in. square and 6½ ft. long. Sugar pine planks planed flat are glued to the sides and ends of the honeycomb block, leaving the top and bottom open. These planks thus frame the core and afford stability during rough bandsawing and machining operations.

Oversize cores are cut from the framed honeycomb block on an Oliver bandsaw in chordwise taper only. Then the rough cut framed unit is machined on an Onsrud High Cycle mill in spanwise and chordwise taper to finished dimensions.

Core dimension is important in most sandwich fabrication, since the dimensional conformances of the entire assembly depends largely on the shape of the core. Northrop holds thickness dimension on milled honeycomb core for these control surfaces to .005 in.

After the milling operation, the core's double taper is checked and after any other necessary machining, it is bathed in hot trichlorethylene to remove all

LEADING EDGE of honeycomb core is glued to the spare of a control surface.

FINALLY heating blankets are applied for curing of assembled surface.

What's behind Eastern's DOUBLE DEPENDABILITY

A look behind the scenes at Eastern Air Line's great maintenance base reveals why Eastern lays such stress on "Double Dependability." There, you will find that Eastern takes extra pains, extra steps throughout its overhaul operations, to make doubly sure its planes perform properly.

And Eastern's deep concern for safety applies in its choice of engine lubricants, too. For this critical element, Eastern relies, exclusively, upon Sinclair Aircraft Oil.

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NIGHT AND DAY—Each of Eastern's planes returns about once a week to the huge maintenance base in Miami for a thorough check up. Every important part of each plane is checked over carefully

ONLY EASTERN DOES THIS—Here parts of the fuel injector are remeasured by the Electrofilmit Gauge. Parts must fit with tolerances between 90 and 110 millionths of an inch!

500 MAN-HOURS are spent on each major engine overhaul—many more hours than standard requirements. This is part of Eastern's Double Dependability

DOUBLY DEPENDABLE LUBRICATION—Eastern demands reliability in its lubrication, too. Only Sinclair Aircraft Oil is used, for less wear, less heat and lowered maintenance costs.

cutting oils and foreign matter.

▶ **Good Bond Assured**—For the skin-to-honeycomb bond, United States Plywood Corp.'s Plycozite 117C adhesive is used. Plycozite requires a chemically clean surface, hence the skins are first dipped in hot alkaline containing Turco 2623 cleaner and water (4 oz to 1 gal. ratio) for 15 to 30 min. A clear hot water bath follows until an unbroken film of water on the skins indicates the chemically clean condition. This is followed by chromodizing, another rinsing and drying in a circulating air oven. Now the skins can take the adhesive.

Tests showed that the adhesive could be sprayed without thinning, with a standard lacquer gun and pressure pot at 60 psi. After spraying, the skins are air-dried for at least 1½ hr., then placed in a circulating air-oven for a 2 hr. precuring to expel the solvents and volatiles not removed by air drying.

After the control surface spar components have been assembled, the core is given two coats of Plycozite with a roller for at least a .032 in. adhesive buildup on the top of the honeycomb column structure. Air-drying and precuring follow.

▶ **Last Steps**—For final assembly of the control surface, six layers of Fiberglas 162 fabric, serving as thermal insulation, are placed on a steel table. A heating blanket is placed over this Fiberglas. The control surface is assembled with tooling and fixtures and placed on a pressure plate on the blanket. An upper pressure plate and heating blanket are now laid over the control surface and then covered with layers of Fiberglas and asbestos.

The entire assembly is covered with a polyvinyl alcohol vacuum bag and vacuum pressure of 12 psi and a temperature of 325F maintained for 25 min. to complete cure of the adhesive.

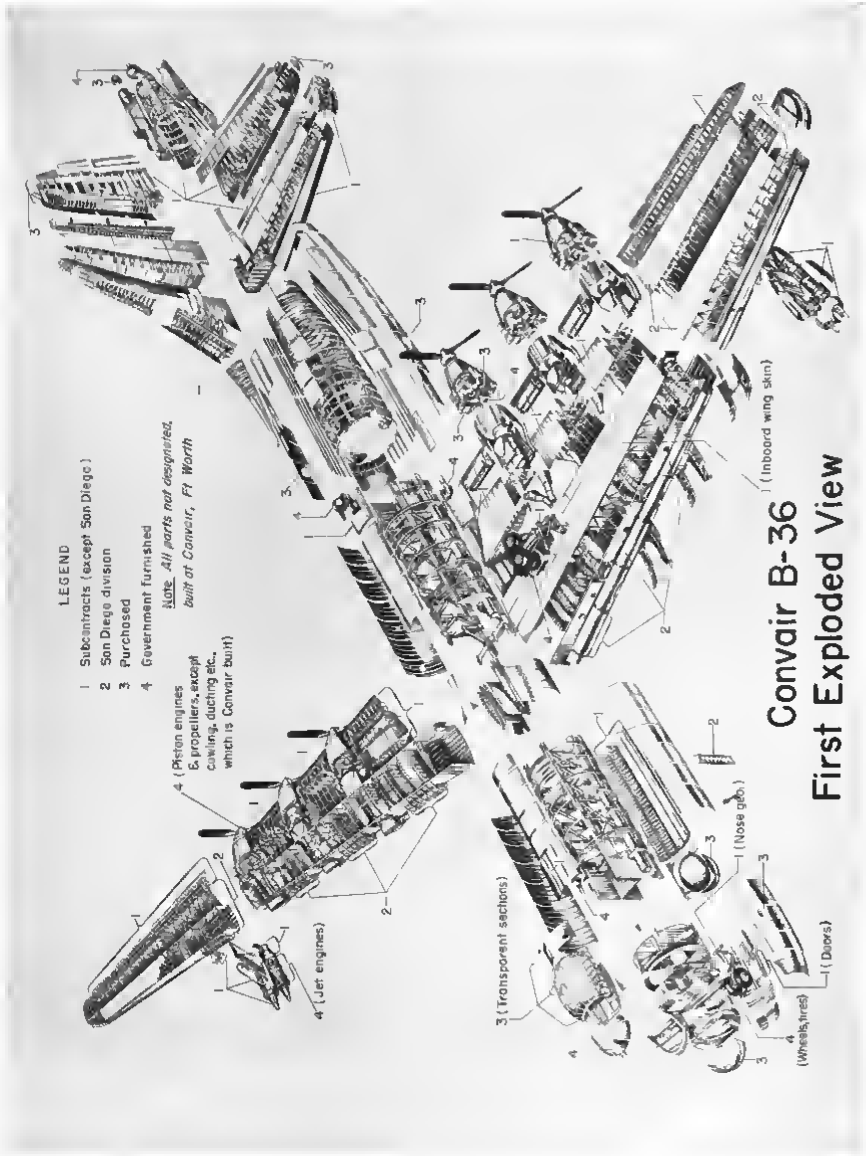
After removal from the curing fixture, the control surface is placed in a jig where end ribs, nose caps and trailing edge are riveted on to complete the assembly.

Simple Jig Speeds B-47 Production

A simple drill block, one end of which serves as a jig for drilling skin holes, the other end being a fixture for reaming these holes to ½ in., is saving about three manhours per unit on Boeing B-47 rear fuselage sections being made by Temco in Dallas.

Previously, when holes were drilled and reamed for bolts used to attach the fin stub chord angles to the main fuselage forging, it was difficult to keep the holes straight or seat the bolt heads properly, requiring considerable rework.

Loyd D. Cain, assistant foreman at Temco's Dallas plant, devised the jig



All America Helps Build the B-36

Convair itself manufactures most of the bomber, but production also involves many subs and suppliers.

By Irving Stone

This exploded view (opposite page) of Convair's B-36—the first breakdown ever to be published of the mammoth bomber—decisively highlights the aircraft industry's production potential.

Obviously, all of the plane's myriad pieces cannot be shown on a drawing of this type—the makeup of this largest production aircraft ties in more than 68,000 shop-made parts, 8,500 different assemblies, and more than 27 mi of wiring in an aircraft volume of nearly 18,000 cu ft. But the breakdown does indicate the enormity of the production task and how Convair goes about it to spread the fabrication load.

▶**What Convair Does**—Convair at Ft. Worth assumes the bulk of the manufacturing job, yet its subcontract and supply sources are extensive. All the parts not designated by identifying number on the drawing represent the Ft. Worth plant effort. This includes, substantially, the entire fuselage except for some doors, tailcone, horizontal stabilizer, elevator and rudder.

Also made at the Ft. Worth plant are the inboard wing box beams, and piston engine ducting and cowling.

▶**Subs, Suppliers**—Supplementing the Ft. Worth division effort are 57 subcontractors and 1,553 suppliers, located in 36 states and the District of Columbia, and furnishing parts, materials and services for the B-36. These do not include suppliers of government-furnished equipment.

In turn, Convair's subs and suppliers, ranging from a porcelain sign maker in Texas to a washing machine company in Iowa, draw on thousands of other manufacturing and feed sources. The exploded view shows only a few of the purchased parts, whereas actually there are hundreds of such items required for the B-36.

▶**Ft. Worth's Contribution**—Twenty-seven of the 57 subs are located in Texas and ten of these are pinpointed in Ft. Worth, emphasizing the growing role of this geographical area in the overall aviation industry picture. These ten include Bell Aircraft Corp., Aerofilates, Inc., United Machine Co., United Heat Treating Co., Marine Aircraft Corp., Lennox Furnace Co., Wilson Specialty Mfg. Co., Crown Machine & Tool Co., and Cobell Supply Corp.

Among the larger Southwestern subs in the B-36 program are Intercontinental Mfg. Co. and Luscombe Airplane Corp., both of Garland, Tex., and Texhte, Inc. and Texas Engineering & Mfg. Co., both of Dallas.

Subs and suppliers in the Ft. Worth-Dallas area do an estimated $3 million business each month with the division.

▶**Facility**—The enormous manufacturing facility Convair has harnessed to engineer and put together the B-36 has a plant and ground area of 546 acres. The buildings—representing an investment of $36 million—spread over 62 acres. Enclosed floor area is more than 4 million sq. ft. and there is an excess of 8½ million sq. ft. of paved working space.

The windowless main building, with its 4,000-ft. long assembly line, is the second largest air conditioned facility in the world—exceeded only by Washington's Pentagon. Air conditioning is a tremendous factor in engineering and production efficiency.

▶**Tools**—The plant uses approximately 2,500 machine tools and 126,500 production tools. There are 24 overhead monorail cabs and cranes with a capacity of 2½ to 15 tons. Last year the division had on order more than $1 million of machine tools, and before the close of 1951, orders for an additional $1¼ million of such units were scheduled to be placed.

Engaged in the division's engineering and production effort are more than 31,000 people.

▶**Backlog**—Convair headed into the new year with a backlog of more than $750 million, including contracts being negotiated and expected to mature.

In addition to the B-36, Convair has built two swept-wing eight-jet YB-60s which were waiting for engines (AVIATION WEEK Jan. 14, p. 48) and the company also has a development contract for an atomic-powered plane.

▶**New Laboratory**—A recent addition to Convair's Ft. Worth setup is a $650,000 engineering test laboratory, affording them 45,000 sq. ft. of working space.

This facility accommodates an altitude chamber for simulation of flights up to a 60,000 ft. height at temperatures falling to as low as 100 deg. below zero.

In this testing facility, numerous B-36 components and equipment items will be put through operational paces. Convair considers this proving vital in determining how to increase the service life of the plane.

In addition to temperature simulation, the laboratory is fitted to produce conditions involving sand, dust, moisture and aridity.

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Illustration shows streamlined, "straight through" design which assures uninterrupted, free flow of air. Cornelius Air Check Valves have high flow capacity with minimum pressure drop.

Illustration shows position of poppet under high differential pressure condition. Note the metal to metal seal as well as the rubber seal

Illustration shows position of poppet under low differential pressure condition. Streamlined poppet and rubber seat provide a positive leaktight seal with differential pressures as low as 0.5 PSI.

Leakage Zero up to 4500 PSI. Working Pressure 3000 PSI Max. Proof Pressure 4500 PSI Min. Burst Pressure 7500 PSI Min. Weight 0.07 lb. aluminum, 0.16 lb. stainless steel (material optional). Ports per AND10056 for ¼" tube. (Other sizes and ports per AND10050 available.) Temperature range —65° to +300°F.

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Pioneers in Developing Pneumatic Systems for Aircraft

PRODUCTION BRIEFING

▶ **Aircraft Armaments, Inc.**, Baltimore, Md., has procured an experimental manufacturing facility at 4108-4110 Plastic Place to be supervised by Harry W. Schmidt, previously with Glenn L. Martin's experimental missile manufacturing section.

▶ **Bell Aircraft Corp.** has leased a plant at 155-59 Chandler St., Buffalo, N. Y., giving the company an additional 67,000 sq. ft. of space for producing and sub-assembly of jet engine nacelle parts. Bell now has 1.8 million sq. ft. of facilities in the Niagara Frontier area.

▶ **Bendix Aviation Corp.'s Utica division, N. Y.**, will be the center of the company's airborne jet plane starter production, will also make four types of aircraft electrical equipment, jet fuel pumps and special vacuum tube-using amplifiers for aircraft instruments and controls. The division was scheduled to start shipping products this month.

▶ **Carma Mfg. Co. of Arizona** is a new production facility established by Carma Mfg. Co., Torrance, Calif., to make pressure regulators, solenoids, blowers, afterburner controls and the like for military aircraft. Harrison Browning has been named president and general manager of the new plant.

▶ **Flexonics Corp.** is the new name for the Chicago Metal Hose Corp., having general offices in Maywood, Ill. Firm is building its sixth manufacturing plant in Memphis, Tenn., to handle aircraft assemblies.

▶ **Lockheed Aircraft Corp.**, Marietta, Ga., has placed an order for 1,500 Wilton machinists' vises with Wilton Tool Co., jobber, Atlanta.

▶ **Swedlow Plastics Co.** has started construction of its third manufacturing plant at Los Angeles, a 36,000 sq. ft. facility at Bandini Blvd., to bring the company's production facilities to 70,000 sq. ft. in this area. The company makes low pressure laminates, custom fabricated sheet plastics and specializes in aircraft glazing applications.

▶ **Thomas Associates**, Los Angeles, have established a 12,700 sq. ft. branch manufacturing facility at Coffeyville, Kans. to produce and stock volume TA clips, clamps and related aircraft and industrial items. Plant superintendent will be Ray Jordan.

▶ **Carl Hirschmann Co.**, 30 Park Ave., Manhasset, N. Y., has opened a western branch at 5124 Pacific Blvd., Los Angeles, to represent some 25 Swiss tool firms.

USAF CONTRACTS

Following is a list of recent USAF contracts announced by Air Materiel Command

Kollsman Instrument Corp., Square D Co 80-06 45th St., Elmhurst, N. Y., indicator, exceeds $253,000

Link Aviation Inc., Binghamton, N. Y., trainers 3 ea., $66,793

Lockheed Aircraft Corp., Burbank, Calif., engineering changes and spares, exceeds $250,000; spare parts, $108,000

Loewy Constructors Co., 570 Lexington Ave., New York, erection of one (1) 20,000 Ton, extrusion press, exceeds $250,000

Lycoming Spencer, Avco Mfg. Corp., Williamsport, Pa., training, $47,548

North American Aviation Inc., Los Angeles, aircraft, exceeds $250,000

Pacific Airmotive Corp., 2940 North Hollywood Way, Burbank, Calif., F-51H aircraft, $208,800

Pan American World Airways, Inc., Airlanic div., New York Airport Station, LaGuardia Field, N. Y., training, $136,806

Radioplane Co., Van Nuys, Calif., type A-7 catapults and related equipment, 5 sets ea., $77,000

Republic Aviation Corp., Farmingdale, L. I., N. Y., aircraft spares, exceeds $250,000

Reynolds Metals Co., 2500 S. Third St., Louisville, Ky., aluminum alloy sheet, $72,857; aluminum alloy sheet, $166,688

Ryan Aeronautical Co., San Diego, Calif., flight test program, $152,283

Scintilla Magneto div., Bendix Aviation Corp., Sidney, N. Y., engine analyzers for C-119 and C-97 aircraft, exceeds $250,000

Sriba Shoe Co., Inc., Portsmouth, O., helmets, 3,404 ea., $129,282

Sikorsky Aircraft div., United Aircraft Corp., Bridgeport, Conn., spares, exceeds $356,000

Solar Aircraft Co., San Diego, Calif., spare parts, exceeds $250,000

Stow Mfg. Co., 445 State St., Binghamton, N. Y., grinder, 200 ea., $30,000

Termstrol div., General Motors Corp., Detroit, components of type N-1 compass system, exceeds $250,000

Sundstrand Machine Tool Co., Rockford, Ill., alternator drives, exceeds $250,000

Trans-Sonics, Inc., Bedford Airport, Mass., transmitters, 5 ea., $62,824

United States Time Corp., Waterbury 20, Conn., indicators & gyro assys., $28,500

The Williams Co., 80 W. First St., London, O., commercial hardware, $30,718

Aeroquip Corp., Jackson, Mich., hose fittings, $48,877

Beech Aircraft Corp., Wichita, spares, exceeds $250,000

Gendin Aviation Corp., Pacific div., 11600 Shrirman Way, N. Hollywood, Calif., valve assembly, $28,950

Gegee Electric Mfg. Co., 52 Iowa Avenue, Paterson 3, N. J., generator sets, 16 ea., $66,000

Holsey Corp. of America, 118 E. 25th Street, N. Y. C. 10, cameras, spare parts, Mich., emergency spares, $30,306

California Cedarcraft Corp., 200 Bush Street, San Francisco 4, non-inflammable aircraft hydraulic fluid, $74,500

Camloc Fastener Corp., 420 Lexington Ave., New York 17, stud fasteners, $53,218

Central States Corp., Omaha, ethyl alcohol, exceeds $250,000

Continental Motors Corp., Muskegon, Mich., emergency spares, $66,630

Curtis-Wright Corp., Caldwell, N. J., test equipment, $38,102

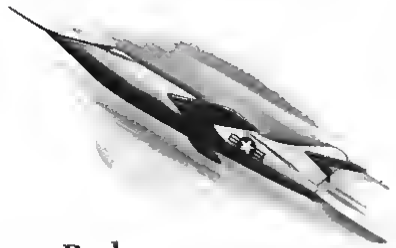
Dana Fastener Co., Box 185, Babylon, N. Y., stud fasteners, $71,122

Eclipse Pioneer div., Bendix Aviation Corp., Teterboro, N. J., generator, 124 ea., $22,235

Garrett Corp., AiResearch Mfg. Co., Los Angeles, assys. and sub assys., $82,431.

George K. Garrett Co., 2 & Tioga Sts., Philadelphia, 34, aircraft hardware, $66,843

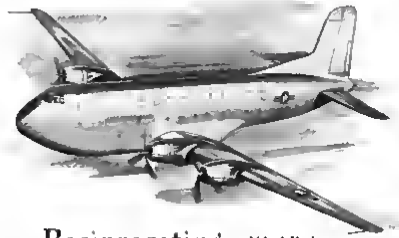
General Electric Co., 1 River Rd., Schenectady 5, N. Y., spare parts, $25,805



Rocket... World famed Navy-Douglas 558-2 *Skyrocket*, which, on August 7, 1951, set new world records for speed and altitude for airplanes of any type or size.

Jet... Designed for intercepting high-flying supersonic enemy planes, the F4D *Skyray* is an advanced-type bat-wing jet, developed by Douglas for the U. S. Navy.

Turbo-prop... First U. S. turbo-prop attack bomber, the A2D *Skyshark*, built for the U. S. Navy and now entering production at El Segundo Division of Douglas.



Reciprocating... World's largest cargo transport now in volume production. It's the C-124 *Globemaster II*, designed to support global operations of the military.

Only Douglas leads in all four power types...

Advance-type Douglas military and commercial aircraft are in service today... You can depend on Douglas for the new "miracle" planes to come!

From the DC-3 to the *Skyrocket*—fastest airplane ever built—Douglas has pioneered remarkable advances in every phase of the art of flight. Undisputed leader in the design and production of the finest in transport airplanes, Douglas has also developed basic airframe types to embrace the three new powers: turbo-prop, jet and rocket. *Douglas is the only manufacturer that has built and flown all four aircraft types!* Certainly this is a tribute to the foresight and creative engineering skills of the Douglas organization. Today, as Douglas continues to mass-produce the aircraft needed now, research and engineering teams push ahead in every field of aeronautics... planning the "miracle" planes that will supersede the near-miracle planes of today. Douglas Aircraft Company, Inc., Santa Monica, California.

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Douglas **Cloudster**, first airplane to lift its own weight in payload • Douglas **M-1**, first U.S. mail plane • **Torpedo 1**, world's first torpedo plane • **C-1**, world's first cargo plane • DWC **World Cruiser**, first to fly around the world • **DC-1**, prototype of famed DC-3 (C-47) • A-20 **Havoc**, famous World War II light bomber • A-26 (B-26 **Invader**), first 400 mph attack bomber • DC-4 (C-54) **Skymaster**, first 4-engine global transport • **SBD**, Navy attack bomber that stopped the Japs at Midway • AD **Skyraider**, Navy attack bomber, now fighting in Korea • **C-74**, largest World War II transport • C-124 **Globemaster II**, largest cargo transport in production • **DC-6** and DC-6A **Liftmaster**, first post-war modern transports • F3D **Skyknight**, first Navy jet night fighter • D558-1 **Skystreak**, first Navy transonic research airplane.

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Now Safe Flight, pioneer in stall instrumeotation, offers progressive pre-stall detection to provide not only infallible pre-stall warning but also to bracket precisely the best landing approach speed for any gross weight condition.

The new multiple sensing unit on the wing's leading edge triggers the Safe Flight coaxially—mounted stick shaker which operates with variable amplitude to provide artificial pre-stall warning plus approach control with more precise definition and more exact margin than possible by any aerodynamic buffeting.

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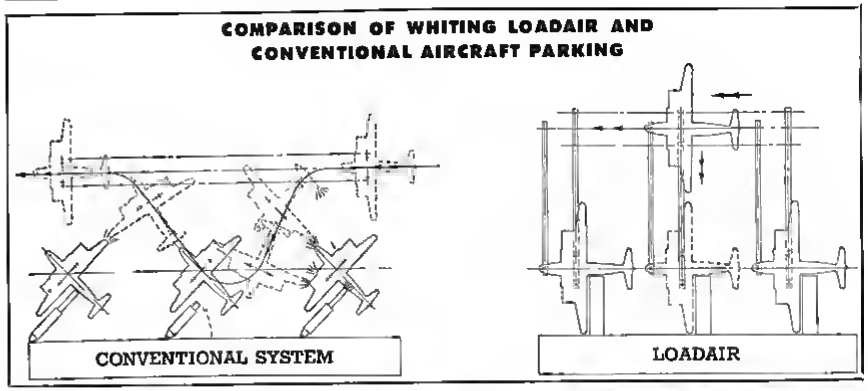
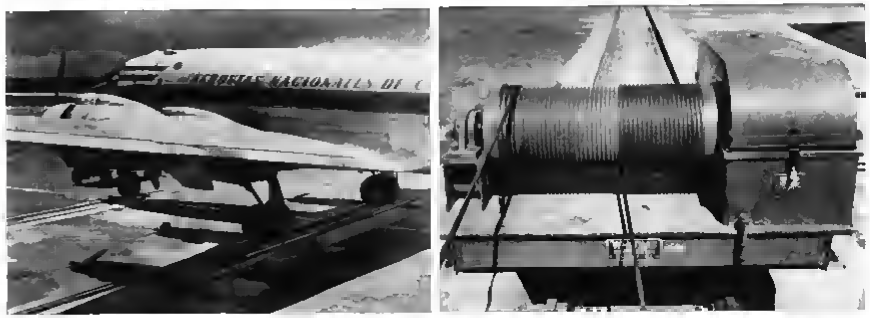




PLANE moves sideways to and from airport terminal dock on track dollies which are pulled by electrically operated winch (right).

Details of Automatic Plane Parking Device

- **Loadair pulls plane sideways on tracks between taxi ramp and terminal; easier loading is claimed.**
- **And company reports ramp time is cut by more than 50%, danger of damaging plane reduced to minimum.**

The first installation of Loadair, an automatic method of sliding aircraft sideways from taxi ramp to airport terminal for loading and unloading, was recently put into operation at Sloedad Airport, Barranquilla, by Avianca, the Colombian airline.

Since its test installation about four months ago, the device reportedly has reduced ramp time by at least 50%.

Loadair consists of two sets of tracks mounted practically flush with the surface of the loading ramp. Three cars roll on these tracks. Two powered dollies, appropriately spaced, accommodate the main gear, a smaller, free moving car carries the nose wheel. Plane is taxied onto the dollies and moved sideways from ramp to airport terminal.

▶ **Many Advantages** — Advantages claimed for the unit by its manufacturer, Whiting Corp., Harvey, Ill.:

• **Greatly expanded utilization** of airport loading space because taxiing aircraft into and out of loading areas takes more ramp space than the Loadair does.

• **Lower cost** in the case of new airports. Building costs are appreciably lowered because Loadair is less expensive to install than thick concrete ramp areas necessary to withstand loads imposed by heavy modern aircraft.

• **Loading and unloading** of passengers and cargo can be performed more rapidly, efficiently and comfortably with Loadair.

Whiting says that moving plane on Loadair can be done more quickly than taxiing it around a congested ramp. Cumbersome (and potentially dangerous) mobile ground equipment can be reduced to a minimum, most of the plane's service now being performed by

PLANE is pulled up flush to terminal dock

fixed units. Passengers are not required to walk long distances in inclement weather. Baggage or cargo is not exposed to the elements.

Stevens H. Hammond, Whiting's chairman of the board, indicated that the system is flexible enough to accommodate aircraft with almost any length of wheel base by providing three or more rails for the nose wheel dolly so that it can be readily switched to the desired position. Adjusting the main gear dollies to take planes with different treads is not often required. If necessary, it is also a simple adjustment.

Nor is snow removal a problem. The dollies may be equipped with small snow plows to keep the tracks clear. Or steam heat or electrical resistance heaters similar to those used by the railroads may be installed.

▶Good for Freight—Although Loadair has many desirable features for handling passengers, it is claimed that more important is its ability to ease freight handling problems.

Being able to move cargo directly from plane to or from loading dock without using intermediate means of carriage should be a tremendous time, labor and money saver. With the growth of freight carriers, as demonstrated by Slick Airways' and The Flying Tigers' purchase of fleets of DC-6As and Seaboard & Western's purchase of Super Constellation 1049Bs for cargo, the future of devices such as Loadair looks bright.

Can Simplifies Hydraulic Filling

The chance of spilling or contaminating the hydraulic fluid used to replenish the cabin supercharger drive system in the Convair 240 has been reduced at Mid-Continent Airlines by using a standard 5-gal. "GI" can, specially equipped for the job.

Mid Continent's engineering department converted the familiar 5-gal. can into a first-class dispenser by adding a pump and several filters for efficient screening of the fluid to prevent entry of foreign matter. The dispenser also is used to refill the hydraulic system in the DC-3, replacing the gallon can formerly used, the airline reports.

The idea of using the GI can was conceived by E. R. Tiffany, crew chief in the aircraft overhaul shop at the carrier's Minneapolis/St. Paul base.

NWA Takes Shimmy Out of Nose Wheels

Delays in Boeing Stratocruiser flights, caused by shimmying of nose wheel assemblies newly installed on the big planes, are being reduced at Northwest Airlines.

Northwest has found it can test these assemblies for dynamic balancing before installation and eliminate shimmy with the addition of weights (1 to 28 oz.) in about 20 min. with a modified automobile wheel balancing machine, Model 330, made by Bear Mfg. Co.

The carrier originally believed the time taken for this preventive measure would not be profitable since nose wheel tires have a short life anyway. But it changed its mind when excessive shimmy held up some flights.

Advance checkout of the wheels not only has succeeded in cutting flight delays, but has extended tire casing life 56.5%, reducing direct operating costs $3,200 annually, an eight-week study indicates. Probable added bonus: Reduction in wear and tear of nose gear shimmy damping mechanism and aircraft structure in vicinity of the wheel attachments.

The $3,200 annual cost saving does not reflect other savings in time previously expended in handling off schedule nose wheel changes or reduction in aircraft delay cost. Cost of the balancing machine: $970 plus modifications.

HOOD permits fluorescent inspection.

Magnaflux Redesigns Inspection Equipment

A complete redesign of its entire line of magnetic inspection equipment is announced by the Magnaflux Corp. The machines are used to inspect ferrous aircraft parts for flaws.

Working on the theory that it is easier to build a large number of a few different units instead of a few numbers of many different units, the manufacturer says that the re-design will greatly improve delivery time of the machines.

Other advantages are reduction in cost in many instances plus a number of detail improvements. The new units are, in most cases, larger than the old models at a comparable price, they can handle a greater diversity of parts, and maintenance has been reduced and simplified.

THROUGH LOOKING GLASS
One man can swing the compass on the F-47 with the help of the mirror rig pictured above. Idea came to a Texas Engineering and Manufacturing Co., Ins. inspector who saw that with the mirror, the man in the cockpit could check the compass rose headings, a job formerly requiring a second man. Mirror can be moved from plane to plane without readjustment.

NEW AVIATION PRODUCTS

Davey Jones Pump

A new vane-type, positive displacement, motor-driven pump for aircraft engine water injection systems is being produced by Romec Pump is designed to be mounted vertically in the ADI tank (anti-detonant injection), fully submerged, motor and all

The pump has been specified for the ADI system in the Martin 4-0-4 Total immersion of the pump assembly means scarce space doesn't have to be allotted it outside the tank Yet all services, connections and adjustments still are easily reached, being exposed on the pump's flush-type mounting plate which faces outward from the tank. The plate fits a standard AN4135 oval tank fitting

The pump weighs 8 5 lb, displaces 0 523 cu in /rev It is rated at 160 gph at 25 psi outlet pressure and 2,800 rpm pump speed, with the motor drawing 9 2 amps. at 27v. d c The relief valve can be adjusted from 20 to 45 psi Assembly is guarded against galvanic corrosion with strong dielectric insulation that prevents ADI solution from acting as an electrolyte

Romec division, Lear, Inc, Elyria, Ohio

Better AN Cleaner

Magnus 751, an effective new cleaner for aircraft parts, reportedly found highly satisfactory by Northwest Airlines, has been announced by Magnus Chemical Co.

The cleaner is non flammable and particularly suitable for removing stubborn gums and carbonized oil from aircraft engine parts, according to the company It also recommends Magnus 751 for cleaning carburetors, fuel pumps, rocker arm assemblies, brake parts, etc Magnus says it is safe for use on all metals and will not damage aluminum alloys, bearing metals, cadmium, solder, diecast and other soft metals

High speed, safety, long life and low costs are advantages listed for the cleaner It can be used in either a hot or cold solution A simple cold water rinse is all that is required after the cleaning operation The product "closely follows" Navy Aeronautical Spec. C 86 and AN C-163, says the firm

Magnus Chemical Co, Inc, South Ave., Garwood, N J

Circuit Guards

Two units for aircraft, based on the same principles of design, one an under-frequency control for 400-cycle electrical systems, the other an overspeed safety control for piston engines and turbos, have been developed by Electroqupt Controls, Inc

The former is designed to trip a circuit breaker if frequency drops below 360c, and close it when frequency is restored to 400c, protecting avionic equipment from high current inrushes

The overspeed safety control takes the speed reference from the ignition system of the piston engine or from the tachometer generator of the turbo It replaces mechanical overspeed governors to shut off fuel and other services should overspeed occur The electrical control unit can be manually or automatically reset and does not require rotating shafts, lubrication or field adjustments It weighs 16 oz and is said to be ruggedly designed for long life.

Electroqupt Controls, Inc., 30 Saga more Hill Dr, Port Washington, N Y

Paint for Engines

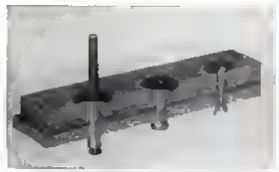
A new aluminum paint designed to protect and enhance appearance of engine blocks, manifolds and exhausts and reportedly already used successfully in certain applications on airplane engines, is being marketed by Tropical Paint & Oil Co.

Called "Thermilite," the product is designed to survive heat from 200 to 1,000F. It is intended for protection of engine parts from deterioration caused by heat, moisture and acids and includes silicones and metallic elements in its makeup.

It produces a silver-bright finish, the maker says

As an example of possible applications, Thermilite is being tested by governor manufacturers for use on choke housings, where unpolished nickel plating ordinarily is used, the company reports.

Tropical Paint & Oil Co., Cleveland 2, O.



Big-Headed Rivet

A blind rivet that provides an increase bearing area for fastening thin or soft materials to metal is being produced by Huck Mfg Co

The new rivet, which can be installed by one person from one side of the work, has a low silhouette, large diameter head

It can be used for securing foil, plywood linings, other types of panels, insulation, etc

The part is available in both aluminum or steel in either a "pull through" or "self-plugging" type in diameters of ⅛, 5/32 and ¼ in

Huck Mfg Co, 2480 Bellevue Ave, Detroit 7, Mich

President Calls For Airline Subsidy Cut

- **Drastic slashes also are planned in airways, airport programs expenditures for fiscal 1953.**
- **And users of federal facilities will be expected to pay their 'fair share' of cost in 'near future.'**

By F. Lee Moore

Airways and airports programs on the CAA are slated for a drastic slash in the fiscal 1953 federal budget.

Airway equipment obligations are cut to a total of only $6 million, compared with 1952's estimated $13.5 million and 1951's actual $10.5 million obligated. And total new obligations for airways establishment are slated at $14.75 million, compared with 1952's $25 million and 1951's $21¼ million.

The federal-aid airport program is chopped to $17.5 million for fiscal 1953 from the estimated $23.5 million in 1952 and $50 million actually obligated for airport aid in 1951. Contractors will feel these cuts immediately after June 30, 1952.

However, day-to-day expenditures budgeted for fiscal 1953 will decline little, this is because of carry-over of expenditures from obligations made in fiscal years 1951 and 1952.

Total new authorizations budgeted for fiscal 1953, including equipment, airport construction, maintenance, salaries and expenses are:

- **Civil Aeronautics Administration** $161,741,499, compared with 1952's $164 million and 1951's $214 million.
- **Civil Aeronautics Board** $3,950,000, compared with $3,875,000 in 1952 and $3,500,000 in 1951.
- **Airline Subsidy** will come to something less than the nearly $35 million estimated for 1951 subsidy by the CAB, the President says in his Budget message.

Major breakdown of 1953 new authorization is salaries and expenses $109 million airways establishment $10.5 million, plus another $10.5 million to liquidate contract authorization, technical development $1.25 million, federal aid for airports $17.5 million, plus $9 million to liquidate contract authorizations, maintenance and operation of Washington Airport is $1¼ million, Air Navigation Development Board $2 million and miscellaneous half a million.

In his annual message, President Truman not only called for reduced airline subsidies he said: "The industry should begin in the near future to bear its fair share of the cost of federally provided facilities through a system of airway user charges." Both suggestions, reduction of subsidies and user charges on federal airways, were made "in view of the increased profitability of airline operations."

Cuts in airways and airports obligations are budgeted despite "substantially increased air traffic (which) has correspondingly increased the normal workload for aviation programs." The cut is therefore applied, the President says, to limitation of airport grants and airway modernization, except for "those projects which are most essential in this emergency period."

Introducing the civil aviation budget, the President notes that, during the past six years, "aircraft capacity operated by the scheduled and nonscheduled airlines has expanded tenfold. This increased capacity, together with its supporting ground facilities, represents an important mobilization reserve—as demonstrated by the present participation of civil carriers in carrying military personnel and supplies to Korea."

The President's remarks on airline subsidies make it apparent that the Administration is disappointed in having to ask Congress for airline subsidies 'again' this year in the disguised form of air mail payments.

He says the CAB subsidy separation studies "represent a significant step in the right direction" but that "the full benefits of subsidy separation will be obtained only when the Board is able to make direct subsidy payments from funds appropriated (by Congress) for that specific purpose."

▶**Separation**—He therefore asks Congress "again that airline subsidies be completely separated from payments for carrying the mail. Any such separation should apply uniform standards to all carriers, international as well as domestic."

Bills to separate subsidies from mail pay are before Congress now, until one is passed, CAB can only make so-called 'administrative' separations—for information purpose only.

▶**The CAA Budget**—Itemization of actual CAA airways programming included in the budget message projects future major airways facilities programs as follows:

	No. of Items to be installed by June 30 1953	No. of Items to be requested from fiscal 1954 on
Instrument Landing Systems	108	4
Approach lights	107	53
Distance measuring equip	13	294
Precision approach radar	31	36
Airport surveillance radar	48	32
Secondary radar	none	83
Automatic direction finding equipment		
(VHF/HF/ADF)	54	182
VHF omnirange installations	427	110
Mechanical Interlocks	30	38

The actual airways establishments budget comes to $14,765,785 for fiscal 1953, compared with $25 million estimated for fiscal 1952 and $21,361,040 actually obligated in 1951. The 1953 airway establishment budget (obligations) by activities breaks down as follows:

- **Air navigation, electronic, and visual facilities** $4,439,650.
- **Intermediate landing fields** $409,410.
- **Air traffic control towers and centers** $4,566,449.
- **Communications stations.** $4,762,497.
- **Housing and facilities** $587,779.

Then the budget calls for $2 million for Air Navigation Development Board obligations, compared with $2,362,961 for 1952 and $2,530,639 in 1951.

Direct obligations for salaries and expenses by CAA are operation of federal airways, $85,047,000, compared with $81 million estimated for 1952 and $74 million in 1951, aviation safety, $11.7 million, compared with $11.8 in 1952, airport development $707,000, aviation development $289,000, general counsel $426,000, operation of aircraft, $2,572,000, aviation information, $285,000, office of administrator, $702,000, staff and administrative services $5,686,000, and other expenses, $1,524,000, for a total of $108,970,000.

▶**Federal Grants for Airports**—The CAA plans to obligate $14.7 million in actual federal grants (excluding obligations needed for administration) airport construction in fiscal 1953, compared with an estimated $20.7 million in 1952 and $39.7 million obligated in fiscal 1951.

Washington to Get AA Coach Service

American Airlines will add a Washington stop to its New York-Los Angeles air coach service via Dallas on Feb 18. This will be Washington's first transcontinental air coach service offered by a scheduled airline.

However, nonscheduled operators have been doing heavy transcontinental business in Washington for some time, some nonskeds send Washington passengers to the West Coast by selling them a package-scheduled airline ticket to New York and nonsked ticket New York-West Coast.

Fares on the American transcontinental service through Washington will be New York-Los Angeles $99, Washington-Los Angeles $97; Washington-Dallas $53; and Dallas-Los Angeles $56.

American plans to start two more of its 70-passenger daily transcontinental DC-6 air coach flights by June.

CAB Sets Cause In Air Show Crash

The Civil Aeronautics Board says that reckless piloting and inadequate briefing by an "air show promoter" caused the death of 19 spectators and the stunting pilot and injured 10 others at Flagler, Colo., last September.

The pilot was an Air Force lieutenant who contracted to fly his Timm aircraft for thrills at the air show his day off. On his way in to land at the show field for briefing, he elected to put on an unscheduled performance first.

In an attempted slow roll too low and too near the crowd, his craft plunged upside down into the assembled people.

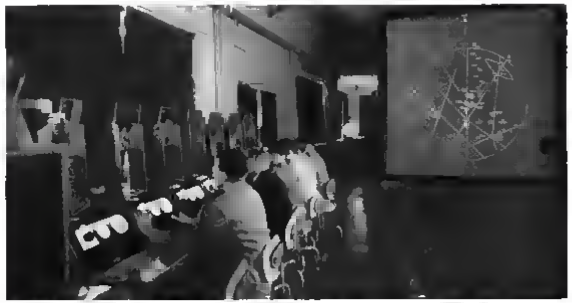
Promptly after the crash Civil Aeronautics Administration tightened its rules for issuance of air show permits and safety standards for them.

American Opens Idlewild Office

American Airlines has opened a ticket office at New York's Idlewild International Airport to AA passengers who wish to continue their journey overseas and those from overseas who wish to continue their journey in the U. S. on American Airlines planes.

The eight-foot counter will be manned at all times by two passenger service agents plus a ticket agent on duty from 9 am. to 5 pm. This is the 11th AA ticket office in the New York area.

Get in the Scrap—Turn Yours in for Defense



SAFETY PROJECT: Controllers at CAA Technical Development Center work out radar control methods. Here they simulate conditions at Washington National Airport.

CAA Budgets For Air Safety

New aircraft safety development projects will get the lion's share of CAA's $1,265,000 technical development funds budgeted for fiscal 1953.

Fire prevention for engines, fuel tanks and engine accessories are highest on the individual project expenditure list. An interesting angle here is the equal emphasis now being given to jet and reciprocating engine fire prevention, despite the fact that no American airline is known to have ordered jet transports.

Air Force supplies jet engine nacelles and other equipment for this phase of CAA fire detection and prevention research. Several military jet engines are CAA certificated for commercial use.

Total CAA technical development budget asked by the President for fiscal 1953 is only $5,000 less than for 1952. Presumably the military applications of most of this work have something to do with Budget Bureau maintenance of this civil budget on a par with last year's.

Here is a list of the safety and airport projects slated for fiscal 1953 at CAA's Technical Development Center, Indianapolis:

▪ **Aircraft projects.** Reciprocating engine fire control; jet engine fire control; crash resistant fuel tanks; cockpit visibility standards; fire testing of equipment and materials; external aircraft lighting standards.

▪ **Airport projects.** Approach and runway lighting; taxi guidance lighting; determination of load transmission through granular bases and flexible paving; determination of subgrade soil moisture; photometric data for aviation ground lights; airport sub-drainage systems; field study of airport construction.

▪ **Electronic aids projects.** In-service improvement of VHF omnirange; in-service improvement of distance measuring equipment; radio-controlled flight and landing development; in-service improvement of surveillance radar; standardization of airborne VHF receivers; demonstration of air navigation and traffic control aids; evaluation of new omnirange equipment; evaluation of new distance-measuring equipment; evaluation of new instrument landing system equipment.

Although exact dollar amounts of these individual projects are not yet available, it can be said that the biggest items are fire prevention, detection and control, most of the rest of the development projects range between $20,000 and $70,000 each for fiscal 1953.

The engine fire development work is mostly done with actual engine nacelles, usually donated by manufacturers or military agencies. For instance, CAA is using a Constellation nacelle donated by Lockheed and a B-29 nacelle (similar to Stratocruiser) from Boeing and the Air Force. CAA is trying now to get a Convair Liner type nacelle from Air Force.

▶ **Fire Tests**—In the development work, CAA first tries to find the potential sources of fire. CAA starts a fire at each of these points, and extinguishes it. This is to determine how much and what type detection equipment is needed at that point and how much extinguishing fluid is needed.

The fire-resistance properties of engine equipment and fire detector units and wiring are separately bench-tested. CAA has developed standard measurements of fire so that equipment manufacturers can check whether their products meet fire resistant specifications determined by CAA bench tests and included in CAA technical orders.

(CAA's development work on cash resistant fuel tanks is extensively covered in AVIATION WEEK Jan. 21, p. 20)

WRECKAGE of NEA's Convair Liner which went into East River on approach to LaGuardia Field is lifted onto salvage barge. No one was seriously injured in crash.

NEA Crash Cause Is Mystery

Many airline pilots are reported shying away from use of radar monitoring and traffic control the last two weeks because they heard erroneous newspaper and wire reports that a radar failure figured in the recent Northeast Airlines water crash at LaGuardia airport.

Actually, the radar operated properly, and radar monitoring was merely an extra aid provided at pilot request on that approach. It was neither a necessary aid nor is the surveillance type radar able to detect whether a plane is flying too low, as this one did, according to civil aeronautics authorities and Air Transport Assn. officials.

The erroneous press reports of radar failure have particularly alarmed CAA and ATA officials at this time because they're just at the critical point in introducing radar traffic control at major airports. They'd been implementing the radar control program slowly in coordination with the Air Line Pilots Assn., taking special care to build it slowly and reliably enough to insure safe procedures.

▶ **What Happened**—Here are basic facts of the strange accident learned so far:

• **Runway 22** was used because wind was south southeast at 5 mph. It is not the ILS instrument runway, and minimum weather for its use is 500 ft. ceiling, 1 mile visibility, compared with 400 ft. and ¾ mile on ILS runway 4.

• **No precision approach radar** is available on Runway 22. The surveillance radar can and did give the pilot directional information.

• **Weather reported** to pilot at 8:30 am, 32 min. before the crash, was 3,000 ft. overcast, 1½ miles visibility.

• **Special weather report** at 9:00, not given to the pilot, gave 2,800 ft. overcast, 1,700 ft. broken clouds, 1½ miles visibility, wind SSE, 5 mph.—still better than the allowable minimum for Runway 22.

• **Plane made contact** with water, on course, about half mile short of the runway, at 9:02 or 9:03.

• **Radar surveillance** showed him to be on course until he disappeared from the radar scope just before hitting. (This radar gives area coverage and loses contact close in.)

• **Radar surveillance** gave him the usual confirmation of course and position after his passing over the LMF range fix, but it cannot give him proper descent rate. Pilot on this type so-called positive position indication (PPI) approach, is guaranteed a straight course and knowledge of where he is, but he must maintain proper altitude and rate of descent on his own, using position information, altimeter reading, and rate of descent reading.

• **At the 500 ft. minimum** altitude, if he could not see where he was going, the pilot was required to execute a missed approach procedure.

Why the plane flew on down below 500 ft. and into the water is the mystery.

▶ **Wind Switched**—One fact is evident from LaGuardia weather observations. The weather deteriorated rapidly during the plane's approach and may have been way below allowable minimum in his approach course. Also, the wind

direction reversed during his approach.

At 9:10, 7-8 minutes after the crash, reported weather at the airport was down to broken clouds at 600 ft. and visibility only a half mile, well below allowable minimum. And at 9:17 it was down to 500 ft. solid overcast with half mile visibility, light rain, light drizzle, fog and smoke, wind 9 mph. north (compared with 5 mph. south 17 min. earlier).

Cubana U. S. Permit Suspended by CAB

Civil Aeronautics Board, with Presidential approval, has retaliated against Cuba for suspending a route permit granted National Airlines reciprocally for one granted Compania Cubana de Aviacion by the U. S.

CAB has issued a stay order suspending the temporary foreign air carrier permit it issued to Cubana on Aug. 13, 1951, between Havana and New York.

CAB says in its suspension order that Cuba "issued but may have suspended" reciprocal permission to National for non-stop service New York-Havana. The National Transport Commission of Cuba, following a resolution of the cabinet, issued an order Nov. 30, 1951, notifying National that it couldn't start the previously-approved service "until the issue raised . . . by Compania Cubana . . . has been resolved."

Cubana grant to National was contingent on "similar authorization" for Cubana by the U. S.

Cubana has objected to its CAB permit because it forbids Cubana from taking advantage of its affiliation with Pan American. CAB forbids Cubana the use of PanAm publicity, scheduling, or any other publicity announced link up with its affiliate.

PanAm had previously announced slow divestiture of its control of Cubana, but reportedly still has controlling, though reduced, interest in the company. PanAm says it owns only 40% of Cubana now.

Eye Rail Crashes

Congress, which over the last several years has spent much time investigating air accidents, may soon switch the spotlight onto railroad accidents, now that CAA and CAB are working all out on the air transport problem.

Sen. Edwin Johnson, chairman of the Senate Interstate and Foreign Commerce Committee, commenting on the "epidemic" of railroad wrecks, says his staff is "exploring the situation to see what attention should be given it by Congress and what treatment is indicated. We are trying to find out whether the tragedies are due to human failure or mechanical failure."

CPA Plans Comet Service in Pacific

San Francisco—Twice-weekly Comet jet airliner service between Honolulu and Sydney, Australia, will be inaugurated by Canadian Pacific Airlines in September, C. W. G. McConachie, president, has announced.

CPA will use Ghost-powered Comets, and does not plan Honolulu-West Coast service until more powerful Mark II Avon Comets are available, probably in 1954, McConachie said.

The 44 passenger, 507-mph. Comets will cut present Stratocruiser and DC-6 flight time between Honolulu and Sydney from 18 hr. to 11¼ hr., CPA estimates. Hops will be fast enough and short enough that all meal service will be on the ground.

While McConachie predicts hefty savings in maintenance costs for the jets, fuel costs are expected to be about 20% higher than present airliners. The Comets will carry 8,800 gal. of kerosene.

British Commonwealth Pacific Airlines also has announced plans to start jet service in the Pacific in 1954. BCPA will use six Comets now on order at a cost of $9 million.

Open Access Door Caused Belly Landing

The CAB accident analysis of the belly landing of an Eastern Air Lines Constellation on a farm near Richmond, Va., last July 19, gives this summary of the "probable cause":

"(It) was the in flight opening of the hydraulic access door, which caused extreme buffeting of the aircraft and resulted in the captain's decision to make an emergency landing."

The Board pointed out in the main part of the report: "Three similar cases had been reported within six months, all known to the carrier. The cause had been ascertained. . . . But no effective corrective action was taken.

"It would therefore appear incumbent upon the carrier to have initiated corrective action and to have notified all pilots."

No one was hurt in the landing.

Braniff Gains

(*McGraw-Hill World News*)

Buenos Aires—Braniff World Airways had a 12% increase in passengers flying from Latin America in the 12 months ending September, 1951. The carrier also flew 8,375,662 miles on its Latin American routes last September, a gain of 2,262,254 miles over the same month in 1950.

These gains prompted Braniff to increase Latin American personnel 20%.

SHORTLINES

▶ **Avianca** reports it carried 620,000 passengers in 1951, up 7% from 1950 ... says affiliate, Lansa, reports a similar gain

▶ **British Overseas Airways** is finalizing commercial arrangements for the first scheduled jet Comet service, it will be in Africa, starting about April

▶ **Capital Airlines** will inaugurate New York-Atlanta "Night Hawk" nightly non stop air coach Feb 3. ... Says this decision "was due largely to a recent CAB policy statement which said that 'coach operations to date have conclusively demonstrated their economic soundness and ... carriers should promptly and substantially expand their coach services'"

▶ **Chicago & Southern Airlines** proposal with Pan American for through Constellation service Chicago-Mexico City via Houston interchange is recommended for CAB approval by Examiner William J. Cusick.

▶ **Civil Aeronautics Administration** will have 12 terminal omniranges installed or programmed at airports by June 30 with fiscal 1951 and 1952 funds. Oklahoma City unit already is commissioned, Toledo will be next month and Washington by June

▶ **Iberia**, Spain's biggest airline, reports it carried 400,000 passengers in 1951, including 12,200 trans-Atlantic, without accident.

▶ **Military Air Transport Service** and other Air Force and Navy heavy transport groups will not get their previously planned equipment build up and replacements, under present fiscal 1953 procurement budget plans for new money obligations. Navy's heavy transport procurement with 1953 funds is nil, and Air Force's 1953 funds for giant Douglas C-124 and multi-purpose Boeing C-97s and most other transport types are reduced

▶ **National Mediation Board** has jurisdiction of the pilot seniority fight between the merged American Overseas pilots and the old-line PanAm pilots, who have voted strike authorization. Observers see cooperative mediation or else arbitration as the only solutions to the seniority fight. ... Member Leverett Edwards has been reappointed by President Truman

▶ **New England Air Express** has won a U. S. Circuit Court of Appeals stay for 30 days against CAB suspension of its letter of registration, this gives the nonskd 30 days to clear up the many alleged mistreatments of passengers

▶ **Pan American World Airways** Constellation flights on the new 2,235 mile Los Angeles-Guatemala City route averaged 34 passengers per flight both north and south the first month of operation. PanAm plans to increase flight frequency (from two a week) as soon as equipment is available

▶ **Pacific Northern Airlines** has started operating from the new Anchorage International Airport, as base and terminal for PNA's flights to Portland, Seattle-Tacoma, western and southeastern Alaska, Kenai, and Kodiak. ... New hangar has over 60,000 sq ft floor space

▶ **Sabena** Belgian airline reports estimated 1951 traffic gains over 1950 as follows: 51,634,992 ton km, up 26%, ton load factor 71%, up 4 points, 307,533,756 passenger km, up 13%.

▶ **Southern Airways** tripled passenger business in 1951. ... Carried 96,572 passengers, up 205% over 1950.

▶ **Swissair** starts direct New York-Frankfurt DC-6B "sleeper chair flights" on Feb 10, time 13 hours, 15 min, once a week.

▶ **Trans World Airlines** says overseas reservations for 1952 are 180% above similar bookings a year ago. ... Current eastbound trans-Atlantic load factors are 15% over a year ago. Notes that lower fares may have something to do with the tripling of advance bookings—with roundtrip air coach rate New York-London starting May 1 at $486, compared with $711 a year ago

▶ **United Air Lines** is slated to get the first Convair production model in March. ... Has 40 of the 44 passenger transports on order for delivery through 1952 and early 1953. ... Plans to introduce Convair service this summer on its West Coast routes. ... Will probably keep all its DC-3s this year. ... Flew 156,188,000 passenger miles in December—24% over a year ago and 1% under November; air freight was down 25% from a year ago to 1,707,000 ton miles

▶ **United Kingdom** airports handled 140,425 passengers in Nov., 1951, 39% over a year ago

▶ **U. S. Airlines** has signed an interline agreement with TACA international airlines providing air cargo service with joint rates from northeastern U. S. to Central America via New Orleans.

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LETTERS

Credit for Kaman

We noted with appreciation in AVIATION WEEK Jan 7 (Strictly Personal) your reference to lack of mention of Kaman Aircraft in the gas turbine powered helicopter press notices

We feel honored that the Navy selected our company to conduct the experiments and we sincerely believe that our part in the project is, at least on a par with the part played by Boeing. It was gratifying to see that AVIATION WEEK, in its article on the gas turbine, gave credit to Kaman Aircraft

CHARLES KIRCHNER
Public Relations Director
Kaman Aircraft Corp
Windsor Locks, Conn

F9F Controls

Concerning the letter of William D Strohmeier published in your Dec 3 issue, this is to advise you that the F9F Panther airplanes do not and never have had, any form of boost on the elevator control system

Further no change has ever been made which resulted in lighter longitudinal control forces

ROBERT L HALL Chief Engineer
Grumman Aircraft Engineering Corp
Bethpage N Y

Airshows Again

I subscribe to and enjoy your magazine it covers the field quite adequately. The articles, on the whole are on interesting subjects and well done... Then I reach the editorial That is like ending a 14-course banquet by serving a somewhat decayed rat sim ripened for dessert

I refer of course to your attitude against airshows (and air races) It seems to me you should be for aviation not apparently dedicating your entire editorial life toward killing some phase of aviation

Don't misunderstand me, I do not enjoy seeing the headlines of the Detroit "fiasco" as you put it the Flagler Colo accident, or the Bill Odom incident They are indeed regrettable and made the worse by newspaper sensationalism and unfairness

Airshows have caused the loss of a few lives, but they have far and away done more service and goodwill than their damage will ever do About two or three of the big losses in airline accidents would cover the total losses of airshows for quite a few years back.

The cure lies not in the amputation of airshows entirely, or even in part Why admit, or profess to show, that airplanes are unsafe except in restricted capacities In the opinion of many, Odom wasn't qualified to fly that race, perhaps the Detroit stunt plane suffered a structural failure more rigid inspection would have cured the Flagler accident was poor managing perhaps or lack of CAA overseeing

You do have some good editorials make more of them that way, and less against airshows I am in no way connected with airshows except as an avid spectator interested in all phases of aviation .

HARVEY F. MACE
5673 La Campana Way,
Sacramento, Cal.

(Reader Mace apparently came in recently as a subscriber Others know we have campaigned for safe airshows, not their "amputation" Most stunts and races are invitations to death and injury, not only to the participants but to innocent bystanders and citizens Races and stunts are unnecessary anyhow so why invite disaster and bad publicity for aviation? There are too many accidents in necessary aviation—military and commercial—as it is—ED)

Too Many Zeroes

I have just finished reading George L Christian's very excellent article on Western Air Lines in the Jan 7, 1952 issue of AVIATION WEEK I enjoyed the article very much However, two discrepancies, no doubt due to a typesetter's pre-occupation with zeroes tend to detract somewhat from the authenticity of the article

The first discrepancy occurs wherein there is listed Western Air Lines' aircraft overhaul summary and 22 000 manhours are indicated as being necessary for an overhaul on the DC 3 aircraft instead of 2 200 man hours and 35,000 man hours on the DC 4 instead of 3 500 also 30 000 manhours on the Convair Liner rather than 3,000 I fear that the above direct labor manhours would tend to compromise our stand with regard to the economy of periodic overhauls

The other discrepancy occurs wherein our R 2800 engine hours are set forth On Convairs Western Air Lines operates 460 rather than 4 600 engine hours per month per airplane (or a fleet total of 4,600 rather than 46 000 engine hours per month) This change, of course, would reduce our premature cylinder removal to one per 781 engine hours, rather than the 7,700 engine hours noted As you can well appreciate, 4 600 engine hours per month per airplane would give us a daily utilization of 781 hours per day The Convair has been a fine airplane at Western, but we still have not figured out a way to accomplish this

HARRISON W HOLZAPFEL
Engineering Manager
Western Air Lines
Los Angeles 45, Calif

Vickers Meeting

Scott Reiniger's articles in the Dec 24 and Dec 31 issues of AVIATION WEEK were excellent He did a wonderful job of reporting the (Transport Aircraft Hydraulic) meeting, and everyone here is most grateful for the kind words he had to say about Vickers

THOMAS B DOE, JR
Vickers Inc
Detroit 32, Mich

ADVERTISERS IN THIS ISSUE

AVIATION WEEK—JANUARY 28, 1952

EDITORIAL

What Causes Crashes?

Last week's tragic American Airlines Convair crash at Elizabeth, N. J., following so closely the sensationalized nonscheduled accident a few weeks earlier in the same city, is a tremendous blow to commercial aviation. Obviously, all of the ramifications cannot be forecast. But they will be widespread, indeed.

We can expect the most searching investigations, reduced operations, changed minimums, tighter regulations, picking up of maintenance and operations systems, an indignant public, government agencies that realize they are on a spot and must take some extreme efforts.

In addition, we shall see the press publicizing and inquiring into this crash and air transportation procedures and methods, as never before.

Fortunately, unlike military aviation, there is no iron curtain of secrecy dropped over commercial aviation accidents, the circumstances surrounding them, and their probable causes. The only possible benefit we can hope to win from this latest tragedy and its unfortunate results is the hope that some measures long overdue will be taken to improve the safety of air transportation. In the meantime, things will be rugged.

We think another explosive public relations situation is shaping up on military air crashes. We have had another wave of Air Force accidents.

The Preparedness Subcommittee of the Senate Armed Services Committee is expected to issue a report shortly which will be critical of a rather high accident rate in basic flight training at Goodfellow AFB.

It seems to us that Sen. Lyndon Johnson's subcommittee is merely nibbling at the edge of a much more important subject. We have contended editorially for some time that the rigid curtain of secrecy dropped over all Air Force accident reports is a great mistake.

As we understand it, every accident is investigated. But the probable causes of such accidents, if they are delved into at all, are virtually never made known to aircraft manufacturers or to other interested agencies or groups.

The Air Force is probably the largest operator of aircraft in the world. If causes—or even probable causes—of its accidents were made known to makers of engines, aircraft and equipment, and to the airlines, it seems likely that important lessons could be learned, some accidents prevented, and human lives saved.

As we editorialized here last April, the USAF's Director of Flying Safety Maj. Gen. V. E. Bertrandias, urged aircraft manufacturers to swap information about design and equipment difficulties, yet he has failed to see that exchange is and must be a two-way street when it comes to the vital subject of air safety. The general still has done little to make available the Air Force's mass of data which manufacturers and training schools need most.

Why is this? Why is the cause of every accident—even when it is discovered—a military secret? Is the Air Force afraid of such disclosures? If so, what is being done about correcting the deficiencies it is worried about?

All commercial accidents are studied thoroughly by CAB, CAA, Air Line Pilots Assn., and others. Public hearings are held and public findings are issued. The result is enlightenment and constructive action in an effort to prevent other accidents of similar natures. Not so with military accidents.

This might well be a subject for investigation by Sen. Johnson's committee.

Security for Whom?

Up front in today's issue, you will find a cutaway drawing of a new gas turbine compressor, built by AiResearch. This illustration should have accompanied the story in last week's issue that described it.

We omitted it last week, as we have omitted many other stories and illustrations, because it was turned down for security clearance by one of the military services. In the normal order of business, we submitted this drawing for security clearance, along with those used last week. Those used had been cleared, this one and another weren't. The official "uncleared" stamp reproduced with this editorial was on the back of this print.

Not approved for public release

RESTRICTED
RESTRICTED

NAVY DEPARTMENT
BUREAU OF AERONAUTICS
11 JAN 1952

Then, imagine our surprise to see the January Naval Aviation News, also out last week, with the drawing that was deemed a security risk.

Naturally, we are tempted to ask, "Security for whom?" When we requested an explanation, we were told that the entire story and the controversial picture were meant to be pulled out of the News' unrestricted edition, but weren't.

Mistakes can happen to anybody. But even aside from the security angle, the incident does bring up a question. Why are all of us taxpayers having to subsidize an aviation magazine—with privileged access to data about tax-paid military developments—that is being sold by the government in an unrestricted edition, competing with unsubsidized, commercial publications that have got to make a profit or quit?

We don't object to commercial competition. That is part of the capitalistic way of life. We do definitely object to competition from the federal government. That is not part of the capitalistic way of life.

—Robert H. Wood

Here's why

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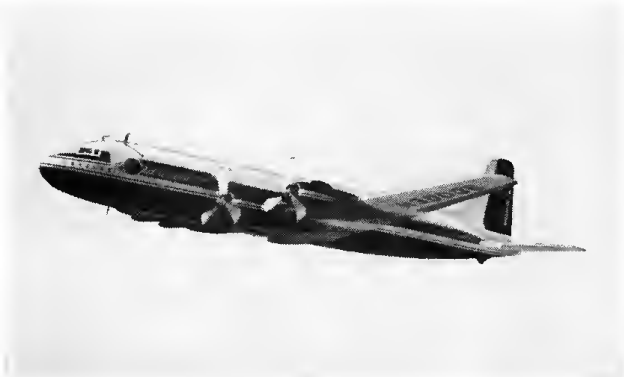
G-E pravides the only pasitive methad af isolating a faulty generatar withaut affecting service. That's ane reasan why all af Pan American's Baeing "Strata" Clippers use G-E systems.



New Dauglas DC-6B's being built far Pan American World Airways will be equipped with G-E electrical systems. G-E pravides the mast camplete electrical pratective systems ever placed in praductian far cammercial transpart-type aircraft.

The cauntry's first turbaprap transpart—the Convair-Allisan Turbaliner—is equipped with a G-E electrical system. G-E systems are tailar-engineered ta give the protection yau need far ardinary ar special applicatians.

The list of planes using G-E protective systems is a roll call of today's most popular aircraft. Are your planes listed among them?

One serious fault that damages electrical equipment in just one of your aircraft could cost you more than G-E protective systems for your entire fleet. Can you afford *not* to investigate?

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